

AUTOMOTIVE INDUSTRIES

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This Week

Practical aspects of cylinder and crankcase design are emphasized by D. Gerdan (Page 242) who contends that mathematical analysis can't do the whole job.

Possibilities of tubular frames for motor vehicles are developed (Page 248) with a drawing of a proposed design.

An interesting angular drive is used on new GMC coaches. Turn to Page 245 for a schematic diagram.

Regular features include "Just Among Ourselves" (Page 249), "Production Lines" (Page 254) and "Horizons of Business" (Page 251).

No Pickle Workers

UAW Officials Insist Membership Limited to Motor Industry

Officials of the United Automobile Workers International, questioned Thursday in Detroit, insisted that, contrary to reports circulated in the press, the U. A. W. is not open to any group of workers, regardless of the industry with which they are connected, and no local of the union has been chartered for pickle workers. The U. A. W. had several of its members working for the Harbauer Co. in Toledo during the period in which they were laid off at automobile plants, and these members promoted organization of Harbauer workers, asking the assistance of the union's head office, which was readily given. Union officials take the position that they would gladly help organization of any workers if asked, but would not actively go out of the automobile industry for members.

Thomas M. Ramsey, former business agent of Local No. 12, United Automobile Workers in Toledo, said to have 8000 members in more than a dozen automotive parts plants, has filed charges against the present leadership of the Toledo local and asked international officers to take over immediately (Turn to page 238, please)

Plants Rush Retooling

Production at Low Point with Only Two Plants Operating; New Car Shortage Likely in October

By Harold E. Gronseth

With most of the automobile manufacturers out of production on 1936 cars, retail sales are making big inroads into field stocks and the possibility of new car shortage developing before new models are available is fast becoming a probability. Several companies expect their dealer organizations to be pretty well cleaned up before the end of September, with new models still several weeks off.

Three more plants finished their 1936 model runs during the past week, all fair-sized producers. This leaves only Ford and Chevrolet still in production on 1936 models.

The industry entered the current month with an estimated 360,000 passenger cars in dealers' hands. The final clean-up of outgoing models by the factories generally results in an increase in field stocks, which is necessary to carry dealers through the changeover period. However, passenger car stocks in the U. S. went up only 4 per cent last month. Many companies would like to have provided a bigger bank for dealers, but materials were used up and the dies were pulled.

August output will contribute probably fewer than 200,000 passenger cars to the supply on hand. Meanwhile, retail sales are running at the rate of 275,000 cars this month. Sales undoubtedly will taper off further in September, but with few plants in production the unsold balance of 1936 model production will be spread pretty thin throughout the country before October is very far along. And as is usually the case at the end of the season, stocks are unbalanced as to body types and unevenly distributed as to the market's requirements. At some points inventories will be exhausted early, while at others the supply may carry into the new model season.

Some doubts have arisen as to whether the car makers will be able to hit their stride on new model production as early as planned. The key to the situation is in the availability of new

tools. Extensive body changes this year have kept the tool and die industry operating at top speed for several weeks, with no sign of a let-up as yet. Detroit shops are all filled up, experienced men are scarce, considerable last-minute work has come in and a large amount of overflow business is going to out-of-town shops. It will require extraordinary effort, say tool men, for some of the manufacturers to meet their original schedule.

Oldsmobile retail sales for the first 10 days in August totaled 4195 units, a new all-time high for the period, according to D. E. Ralston, Oldsmobile vice-president and general manager. From Jan. 1 to Aug. 10, 133,155 Oldsmobiles were delivered to retail customers. This (Turn to page 238, please)

GMAC Floats Loan

\$100,000,000 of 10-Year 3s and 15-Year 3½s Offered

General Motors Acceptance Corp. offered on Thursday \$100,000,000 of debentures, the proceeds of which will be used in part to fund bank debt and in part for the purchase of new installment paper. The offering, made for the company by Morgan, Stanley & Co. and a group, was divided into two portions, \$50,000,000 of ten year 3s and \$50,000,000 of fifteen year 3½s, both priced at 101½.

The company's prospectus showed that it had made net profits for the first five months of 1936 of \$5,127,816, against \$12,103,695 for all of 1935. It paid \$36 a share in 1935 in dividends to General Motors Corp., which owns its 500,000 shares of stock. For the first five months of the year the company did a business of \$630,461,414 against \$1,030,594,565 for the year 1935.

On May 31 the balance sheet showed cash of \$41,399,351 and net receivables after reserves of \$451,166,259. Of this, \$443,259,366 was in United States paper and \$34,157,534 in Canadian and foreign paper. Notes payable were \$320,878,643.

New Willys Plan Filed

Minor Changes in Reorganization Proposals Made Before Deadline; Tax Official Files Only Objection

A proposed underwriting agreement together with several slight modifications of the Willys-Overland reorganization plan were filed in Federal court at Toledo prior to the Aug. 15 deadline for filing of objections to the plan.

Only one formal objection was filed and that was by the tax officials of Lucas County, disagreeing with the settlement proposed of \$400,000 to settle tax claims of about \$793,000.

Conferences early this week between representatives of Empire Securities, Inc., appraisers, and county officials, resulted in agreement to let Judge George P. Hahn in Federal court decide at a special hearing Thursday what would be a fair compromise of the tax claim.

George W. Ritter, counsel for Empire Securities, Inc., told county tax officials that unless the property for manufacturing could be delivered free and clear by Sept. 3 the underwriting agreement would be lost. It is understood that E. H. Rollins & Co., New York, are chief underwriters.

The proposed agreement provides for the purchase by the underwriters of the 350,000 shares of \$10 par preferred and 2,850,000 shares of \$1 par common stock of Willys-Overland Motors, Inc., a Delaware corporation.

One important change in the plan is that a cash settlement of 25 cents on the dollar is extended to general creditors of Willys-Overland if they do not desire to take stock in exchange for claims.

Creditors may also at option receive 5 per cent cumulative preferred stock of Willys-Overland Realization Co., to which is to be transferred all of the properties not acquired by the new manufacturing company. They would receive for claims a par value of this stock equal to 12½ per cent of the principal amount of the claims, and pro-rata portion of 1,102,850 shares of common stock of the new manufacturing company and 6000 shares of \$1 par common stock of the realization company based on the ratio of total claims participating in this option to all creditor claims.

Amendments to the plan further provide that holders of the \$2,000,000 of gold bonds of Willys-Overland Co. shall receive for each \$1,000 bond 70 shares of \$10 preferred stock in the new company, or 210 shares of common stock, and in addition 22 shares of \$25 par preferred stock of the Willys-Overland Realization Co.

The amendments give the option to creditors and bondholders to participate further in liquidation of "left over" assets after setting up the new manufacturing company.

Empire Securities, Inc., owns more than 70 per cent of bonds and 97 per cent of unsecured indebtedness.

The reorganization plan is to be up



Photo from Pictures, Inc.

New York motorists are installing safety reflectors on their cars to comply with the new state requirements, effective Oct. 1.

for hearing before Judge Hahn on Aug. 21. It is expected the hearings may take several days. By the terms of the underwriting agreement the plan may be put into effect immediately upon confirmation, it was stated.

During the last three years Willys-Overland, operating under David R. Wilson as receiver and trustee, has ex-

pendent more than \$13,000,000 for materials and 106 Toledo manufacturers participated in the business.

Robert A. Stranahan, president of Champion Spark Plug Co., and Harry C. Tillotson, president of Tillotson Manufacturing Co., were among the local business and civic leaders who hailed Willys-Overland reorganization as the most important industrial step which could be taken in Toledo.

Illinois Automotive Ass'n Show Set for April 24-28

The Illinois Automotive Association announces that its fourth annual show and maintenance exhibits will be held from April 24-28, 1937, at Navy Pier in Chicago. Abe Cole, executive secretary of the association and show manager, announces that the size of next year's event will not be materially increased. He reveals, however, that more than 90 per cent of the available space has been reserved. Efforts next year are to be directed toward bringing jobbers' salesmen into closer contact with the affair.

45 New Studebaker Dealers

Studebaker appointed 44 new dealers in the United States and one in Alaska during the month of July, according to an announcement made by George D. Keiler, vice-president in charge of sales. The total number of dealers appointed during 1936 is 539.

Chevrolet's Soap Box Derby

Now an International Event, Third Staging of Juvenile Contest Draws 100,000 Spectators

One hundred thousand persons saw 116 juvenile racers from as many American cities, vie for honors in the third running of the All-American Soap Box Derby at Akron, Ohio, last Sunday. Sponsored by the Chevrolet Motor Co. in cooperation with leading newspapers the soap box derby graduated from the category of an All-American amateur juvenile racing event into the class of an international event when Herbert Muench, 14-year-old son of a St. Louis X-ray specialist and winner of the All-American championship, raced Norman Neumann of Pretoria, South Africa, for the world's championship, which he won easily.

The scene at Akron resembled a miniature Indianapolis speedway race, with service pits and pit attendants to attend the tiny racers, and Harry Hartz and "Wild Bill" Cummings cheering the contestants and Captain Eddie Rickenbacker acting as one of the race officials.

For his All-American victory Herbert received a \$2,000 college scholarship, a gold medal set with diamonds, the All-American trophy and the Indianapolis speedway trophy for the fastest car. Harold Hanson of White Plains, N. Y., who finished second, won

a Chevrolet Master two-door sedan and a medal set with rubies. Robert Richards of Lima, Ohio, in third place, won a Chevrolet Standard sedan and a medal set with sapphires. Other prizes included moving picture cameras, and wrist watches for the 116 city champions. Muench and Hanson both received international trophies, both having crossed the line ahead of the South African champion.

M. E. Coyle, president, and C. P. Fiskin, advertising manager, of the Chevrolet Motor Co., awarded the prizes at a banquet following the races. This year for the first time all professionally built racers were barred. Each contestant certified he had built his own racer and had not spent more than \$10 for parts.

The races were broadcast by Graham McNamee over an N.B.C. nation-wide network, and by short wave to Europe and the South African home of Norman Neumann.

At the newspapermen's banquet which preceded the race, Mr. Coyle said that Chevrolet was glad to continue to sponsor the event nationally in the interests of American boys even if it didn't result in a line of publicity for his company.

ASI Drawing Sept. 11

*All Available Show Space
Is Applied For*

Applications now on hand for every bit of available display space in the 1936 Automotive Service Industries Show make it appear that the Show Operating Committee may have to set a limit on the amount of space allotted to any one concern, in order that all qualified applicants for space can be accommodated. According to a report from the Chicago office of A. B. Coffman, show manager, 288 concerns had filed their space applications by midnight, Aug. 10, the deadline for receipt of applications to be included in the first space drawing.

At the show space drawings to be held in the Hotel Sherman in Chicago on Sept. 11, manufacturers whose applications were on file by Aug. 10 will receive first consideration while new members and those filing after that date will participate in the second drawing. The drawings will be under the supervision of the Joint Operating Committee, representing the three sponsoring associations, the National Standard Parts Association, Motor & Equipment Wholesalers Association, and Motor & Equipment Manufacturers Association.

Foundrymen's Conference To Be Held at U. of Iowa

The American Foundrymen's Association announces that an important two-day conference on "Foundry Practice" will be held at the University of Iowa, Iowa City, Iowa, Friday and Saturday, Oct. 30 and 31. The conference is being sponsored by the College of Engineering of the University, the A.F.A. through its Quad-City Chapter and the Northern Iowa Foundrymen's Association.

The program will consist of sessions on melting practice, sand control and other current foundry problems. Out-

Site of New York's 1939 World's Fair is already a scene of activity as Gar Wood bulldozers begin leveling off some 1000 acres.



Globe photo

standing experts will give the talks and lead the discussions. The detailed program is not ready as yet but will be announced later.

This conference will be similar to the annual District Conferences held at Michigan State College, East Lansing, Mich., and is one of the several which the A.F.A. is assisting in developing.

Canada's Motor Revenue Rises

A preliminary report issued by the Canadian Government shows that registration of motor vehicles, drivers' licenses, gasoline tax and the like in 1935 brought \$54,587,920 into Canada's provincial treasuries. The figure compared with a total of \$50,622,683 in 1934.

To Promote Uniform State Laws

*Accident Prevention Conference Begins Active Campaign
for Unification of Traffic Regulations*

Active work designed to effect unification of traffic regulations throughout the United States was begun this week by a subcommittee of the Accident Prevention Conference headed by Representative Emmet O'Neal, of Louisville, Ky. The conference was organized by Secretary Roper at the suggestion of President Roosevelt.

Invitations have gone forward to one man in every State and the District of Columbia to act as key contacts for the conference. Forty acceptances have been received and in 14 States the contact men, cooperating with the Governors, have set up working committees. A meeting of Representative O'Neal's committee to draft a national program is to be held in Washington soon.

Shortly thereafter, a joint meeting of the committee and the key men from the various States will be called to work out further details.

Primarily, the conference will seek to have drivers' license laws enacted in States which do not now have them. Plans also will be made for strengthening other State traffic laws. It is hoped to have complete programs ready for introduction when the next State legislatures meet. Forty-two are scheduled to meet in January.

Virtually all national organizations interested in accident prevention have pledged their cooperation to the conference. They represent, among others, automotive manufacturers, farmers and civic and public official groups. Included in the latter group is the American Association of Motor Vehicle Administrators. This organization is making a detailed study of existing laws and will submit numerous recommendations. The work of the conference will be chiefly educational and promotional.

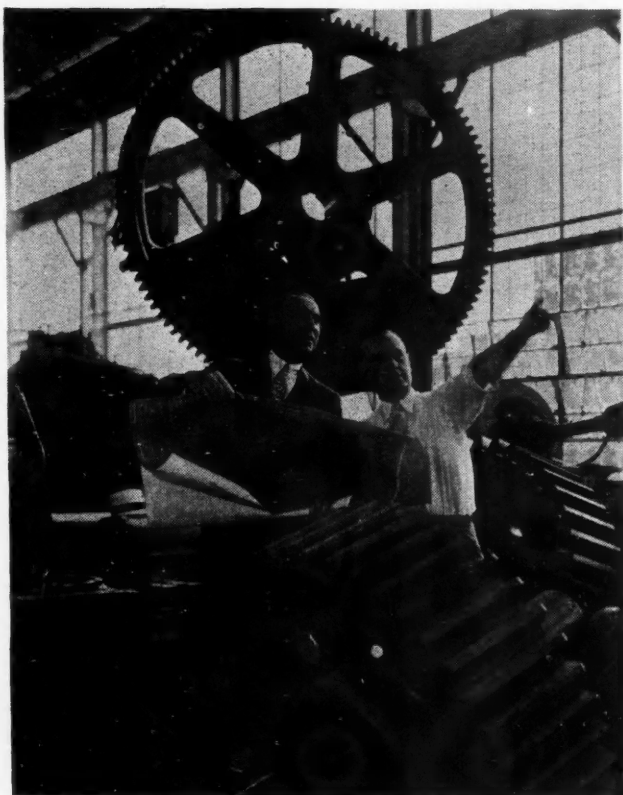
GM Opens Pacific Coast Public Relations Office

General Motors Corp. has opened a Pacific Coast office of its Department of Public Relations, it was announced this week. In charge of the new office, which is located at 612 Financial Center Building, San Francisco, is Don Still, former newspaperman and former manager of the Los Angeles office of Campbell-Ewald Co.

The move was necessitated by the growing importance of the Pacific Coast in General Motors activities.



M. E. Coyle, president of Chevrolet Motor Co., awards the All-American Soap Box Derby trophy and a \$2,000 college Scholarship to Herbert Muench, age 14, of St. Louis, who won the Derby at Akron last week. At the right is C. P. Fisk, Chevrolet's advertising manager.



Machinery is being installed in Detroit's newest automobile factory, the De Soto plant now nearing completion. L. G. Peed (left), De Soto vice-president, and J. Frank Hughes, superintendent of De Soto's press plant, supervise installation of the huge presses.

:SLANTS:

PROVING GROUND—Not new cars, but junked ones, are used at the American Steel & Wire Co.'s proving ground near Worcester, Mass. The old cars are bought from a wrecking company, the only requirement being that they have bumpers and tires in fair condition. The cars, without drivers, are started down a grooved runway built on a hillside to provide a drop of 55 ft. in 350 ft., and at the bottom, traveling at a speed of 40 to 50 m.p.h., they crash into test sections of the various plate and wire road guards made by the company. Fenders are crumpled and headlights smashed, but no car has overturned and no windshield has ever been broken as the car is deflected by the guards, says the "U. S. Steel News."

PRESIDENTIAL POLL—Goodyear Tire & Rubber Co. has arranged for the broadcast, three times a week for nine weeks, of the "Literary Digest's" presidential poll. This will be the first time the Digest's copyrighted figures, which have a record of forecasting elections with remarkable accuracy, will be made available over the air. The broadcasts, over a nation-wide network of N.B.C. Stations, will begin Wednesday night Sept. 2, and continue every Monday, Wednesday, and Friday evening thereafter until the day before election, Monday, Nov. 2.

AIR PROGRESS—Again this year plans for the observance of "air prog-

ress" are being made in many sections of the country. Dates fixed are Sept. 1 to Oct. 10, inclusive. Beginning with the national air races in Los Angeles, a series of important events are already scheduled in 16 cities. Official representatives of other American nations will again visit this country. Many new airports will be dedicated. Ray W. Brown is national chairman of the Air Program committee and is now forming an organization of well-known men in various parts of the country.

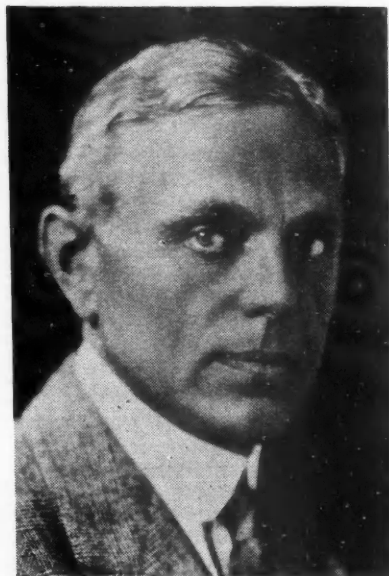
NEAR EAST BOOM—Rebellion in Palestine, advent of a Fascist dictator in Greece, the Italo-Abyssinian conflict, these and other threatening disorders fail to discourage the optimism of M. E. Wagner, Studebaker's Near East representative, who has just returned to his factory with tales of a coming boom in motor transportation in that part of the world. A beaten path along the pipe line from the oil fields of Mosul on the Euphrates to Tripoli and Haifa is fast becoming a self-made highway from India to the Mediterranean ports, adding to the demand for American cars, trucks and buses. In Egypt, the government is fostering an extensive highway construction program and has just completed a super-road between Alexandria and Cairo. Recognizing that their hold on Ethiopia depends primarily on the road system, the Italians continue their road-building program. An additional 3000 kilometers should be completed within the next 10 months. These are some of the factors that explain Mr. Wagner's optimism.

Norval Hawkins Dies

Early Ford Auditor Became Famous as Sales Genius

Norval A. Hawkins who, as the first general sales manager of the Ford Motor Co., gained national reputation as a super-salesman, died suddenly of a heart attack in his home, 470 Merrick Avenue, Detroit, last Tuesday. He was 69 years old.

At the time of his death Mr. Hawkins was partner in the firm of Hawkins, Gies and Co., certified public accountants, a company he organized in 1898. Throughout his colorful career he had been engaged in numerous business enterprises and had amassed a comfortable fortune which was swept



N. A. Hawkins

away in the collapse of the Detroit banking structure in 1933. Then last November the man who in 1915 was said to have received a million dollar salary from Henry Ford, the man who was the object of countless success stories and was himself author of the book, "Certain Success," went broke. He filed a voluntary bankruptcy petition in Federal Court listing liabilities of \$350,377 and assets of \$293.

Mr. Hawkins was born at Ypsilanti, Mich., July 10, 1867. After attending the Ypsilanti high school and Cleary's Business College in his home town he came to Detroit in 1888.

He leaped into the business arena of the nation in 1904 when he accepted Henry Ford's offer to systematize the then struggling business as auditor. His work was so thorough that in 1907 James Couzens, then secretary-treasurer of the Ford Motor Co., made Hawkins commercial manager and promptly promoted him to general sales manager, a post he held for 11 years so successfully that he was the talk of the industry.

The year before Hawkins became Ford sales manager, 6181 cars were

marketed while there were only eight small sales branches with a few hundred dealers. Under his administration the sales and assembly plants increased to 86 and the dealer organization to nearly 11,000. He kept the factory constantly sold out. In 1917 he was responsible for the distribution of 815,912 cars.

Many tales are told of his prowess in the selling game. On one of his trips to the field it is said he encountered dealers who doubted that their territory could absorb a dozen cars a year. Hawkins ordered these doubters to take him about the country and in a single afternoon while the local agents looked on in astonishment he would sell a dozen farmers and townspeople new Ford cars and turn over the orders to the agents.

He resigned his Ford post in 1919 and attended to private interests for a year. In 1920 he accepted a contract under which he became an advisory expert on sales, service and advertising for General Motors at a salary of \$150,000 a year. He stayed there three years. Among his activities were the Sturgis Steel Go-Cart Co., of Sturgis, Mich., a \$3,000,000 concern devoted to the manufacture of baby perambulators of which he was president, chairman of the board of the Detroit Lubricator Co. and classes in salesmanship and advertising and business efficiency.

He wrote two books, "The Selling Process" and "Certain Success," published them himself, and sold more than 80,000 copies. He organized the Boys' Club of Detroit and was its treasurer, raising all the money himself for its support for three years. Single-handed, he would get together \$25,000 to \$30,000 for the club. In raising money for charitable or semi-public enterprises he had a gift that was equalled by few.

A story is told of the days he spent in Harper Hospital following an operation for appendicitis that was characteristic of the man. In the hospital he found some things that were annoying to a sick man, for instance, the chair in his room when moved made a harsh sound on the bare floor and he thought it ought to be rubber-tipped. "Why," he wanted to know, "weren't these and other needed improvements made?"

"There was no money," was the answer he received.

The day Mr. Hawkins left he raised \$55,000 for the improvements he thought the hospital ought to have.

Hawkins, besides being active in the Detroit Board of Commerce, was a mem-

ber of the American Institute of Accountants. He also served as a trustee of the Detroit Bureau of Government Research.

A golf enthusiast, he was president of the Detroit District Golf Association for the last two years, member of the Detroit Golf Club and served as its treasurer from 1927 to 1929. Other memberships which he held were the Detroit Club, Country Club, Detroit Athletic Club, Oakland Hills Country Club, Detroit Boat Club and Association of Golf Club Presidents.

Funeral services were held at the home Friday afternoon. The Rev. W. H. Aulenbach of Christ Episcopal Church, Cranbrook, officiated. Burial was in Woodlawn Cemetery. His wife, Mabel, survives.

Frederick S. Fish

Frederick Samuel Fish, 84, who played a prominent part in the formation of the Studebaker Corp., and who has been credited with having influenced the company, which at that time manufactured only wagons and carriages, to enter the automobile field, died at his home in South Bend last week.

Mr. Fish was born at Newark, N. J. He became affiliated with the Stude-



Frederick S. Fish

baker brothers in 1891 as their attorney. He was connected with the company continuously until the reorganization in 1935, and from 1915 until his retirement was a member of the board of directors.



V. FLETCHER HARPER has resigned his position with the Allis-Chalmers Mfg. Co., Milwaukee, and is now associated with the Globe-Union Mfg. Co. of the same city. He was president of the American Society for Steel Treating in 1927 and is well-known for his articles on metallurgy.

E. M. SCHULTHEIS, formerly of the Timken Roller Bearing Co., has been appointed assistant salesmanager of the Clark Equipment Co., Buchanan, Mich. He will have offices in the Fisher Building, Detroit, where he will be associated with C. E. Stanneger, district manager of the Clark Tractor Co., of Battle Creek, subsidiary of the Clark Equipment Co.

FRANK D. LONGYEAR has been promoted to the post of production supervisor for the Reo Motor Car Co. Joining Reo 21 years ago, Mr. Longyear has been for the past several years superintendent of the material control division.

WILLIAM M. HANSON, advertising manager of the Four Wheel Drive Auto Co., Clintonville, Wis., has resigned, effective Aug. 31, to make a new connection in another industry at Algoma, Wis.

PAUL H. FASSNACHT, who was well known in Germany as an automobile race driver several years ago, this week took over the duties of director of public relations at the Stevens Hotel in Chicago.

GEORGE SUMMERFIELD has been appointed chief inspector of the Hill Diesel Engine Co., Lansing, Mich.

L. R. SMITH was elected chairman of the board at a recent meeting of the directors of the A. O. Smith Corp., Milwaukee. W. C. HEATH was elected president, and J. M. FLOYD was elected vice-president in charge of manufacturing and engineering.

R. W. DAVIS, electrical engineer with the Allis-Chalmers Mfg. Co., has been recently appointed assistant manager of the electrical department at Milwaukee.

EDWIN R. PALMER has been appointed general manager of Opel, General Motors' German subsidiary.

A. N. BENSON, who succeeded the late Jack Frost in April as executive head of the National Automobile Dealers Association with the title of assistant to the president, has been named general manager of the association. Previous to his N.A.D.A. connection, Mr. Benson was general manager of the Minnesota dealers' association.

R. S. ARMSTRONG has resigned from the National Highway Users Conference. For a number of years he has handled legislative work for the conference. Previously he did somewhat similar work for the Motor Vehicle Conference Committee.

The first series of concise product summaries of flexible finishing materials engineered by the Roxalin Flexible Lacquer Co., Elizabeth, N. J., have just come off the press. These bulletins contain descriptions of Blax and Leaflex Aluminum; Ba-Flex, the flexible enamel that withstands a chromium plating solution and requires only one bake; and Blue Knight Taupe No. 978A, the latest product summary included in the series.

Earnings Statements of Automotive Companies

	2nd Quarter 1936	2nd Quarter 1935
American Coach & Body Co.....	96,114†
Bower Roller Bearing Co.....	603,700†
Mullins Manufacturing Co.....	177,265	158,021
Raybestos-Manhattan, Inc.	989,122†	752,360†
Thermoid Co.	91,517	38,561
Timken Detroit Axle Co.....	804,095†	397,425

* Net loss. † 6 months.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

General business activity slowed up somewhat last week, although gains continued in wholesale lines. High temperatures in many parts of the country had the effect of slackening retail trade. The volume of wholesale buying was estimated at from 20 to 30 per cent above that in the corresponding period last year. Drought conditions continued, accompanied by record temperatures in some sections.

Carloadings Decline Slightly

Railway freight loadings during the week ended Aug. 8 amounted to 728,293 cars, which marks a decline of 19,258 cars below those in the preceding week, a gain of 146,216 cars above those a year ago, and an increase of 124,325 cars above those two years ago.

Retail Sales Best Since '31

Department store sales in July were sustained at a level greater than usual in that month and were larger than in any other month since the middle of 1931, according to the Board of Governors of the Federal Reserve System. The adjusted index stood at 91, based on the 1923-25 average as 100, as against 88 for June.

Power Output Steady

Production of electricity by the electric light and power industry in the United States during the week ended Aug. 8 showed little change from that in

the preceding week, but the level was 14.3 per cent above that in the corresponding week last year.

Lumber Orders Heavier

Production of lumber during the week ended Aug. 8 was 68 per cent of the 1929 weekly average. New orders were below production for the sixteenth consecutive week, although ordering was the heaviest for any week, excepting one, since early May.

Crude Production Rising

Average daily crude oil production for the week ended Aug. 8 amounted to 2,963,800 bbl., as against 2,948,000 bbl. for the preceding week and 2,656,850 a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended Aug. 15 stood at 84.0, as against 84.3 the week before and 83.7 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Aug. 12 showed an increase of \$4,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and government securities remained unchanged. Money in circulation increased \$7,000,000, and the monetary gold stock rose \$11,000,000.

Big Buyers' Show

Chicago Accessory Exhibit Drew Over 1200 Visitors

Buyers for mail order, chain store and many of the leading jobbing houses, who comprise the "Quantity Buyers" group of the accessories and parts trade, were all in Chicago this week attending the semi-annual show staged by the Automotive Accessories Association. Nearly 1200 buyers were registered to see the displays of close to 175 manufacturers.

Exhibitors declared themselves highly optimistic over the prospects for a heavy fall and winter trade. Numerous concerns reported sales of over \$200,000, which were made possible primarily by the influx of eastern buyers for chain organizations. These were not expected to attend in any great numbers, and their appearance enabled several manufacturers to establish all-time high sales records for exhibits.

The exhibitors on Tuesday formed a permanent organization. Baldwin Sears, secretary of the Aurora Equipment Co. of Aurora, Ill., was elected president, and was also named to serve as chairman of the executive committee and was given the same post on the board of directors. The executive committee comprises: Baldwin Sears, chairman; Fred C. Tams, Globe Specialty Co., Chicago, vice-president; S. M. Dover, Do-Ray Lamp Co., Chicago, treasurer; and R. Garland Ames, executive secretary.

The following were named as members of the board of directors: Baldwin Sears, chairman; Joseph Kohn, Protection Products Co., Bridgeport, Conn.; Harry Golden, Magna Products Co., New York City; Fred Keuthen, Interstate Enamel & Varnish Co., Indian-

Pontiac Plans 3-Day Course for Retailers

Sales executives of the Pontiac Motor Co. are determined to build the best trained retail selling organization in the automotive industry, says C. P. Simpson, vice-president and general sales manager.

"While successful selling depends to a great extent on natural ability," says Simpson, "it depends to a far greater extent on proper training in the most effective application of that ability. Therefore, the Pontiac Motor Co. contemplates a course in sales training for its retail selling organization which should materially increase their productivity and earning power."

This course, which will be conducted under the supervision of a nationally recognized authority on retail selling, will consist of a series of six sessions over a period of three days. It will deal with the fundamentals of selling, as applied to Pontiac automobiles. It will deal with the obstacles most frequently encountered, and instruct in proven

methods of overcoming them. It will cover every phase of selling cars in such a clear, concise and logical manner that everyone who tries will be able to tremendously increase his selling and earning ability.

Saurer Officials Coming to Study U.S. Diesel Progress

E. B. Wakefield, general manager, Armstrong-Saurer Commercial Vehicles, Ltd., Newcastle-on-Tyne, England, and executives from the Saurer company's plant in Switzerland will visit factories of American motor truck manufacturers and engine makers during September, according to the Automobile Manufacturers Association.

The visit is planned to give the Swiss manufacturers an insight into the development during the past five years of Diesel engines by American manufacturers, particularly in the motor truck field. A Diesel engine for highway use, designed by the Saurer company, will be demonstrated by the visitors.

40 Years Ago

—with the ancestors of
AUTOMOTIVE INDUSTRIES

C. W. Kennedy, an electrical engineer of Rutledge, Pa., has completed an electric carriage that has a number of novel features.

The electric vehicle on which Messrs. Barrett and Perret have been engaged for some months past is nearing completion. Several tests were made in Brooklyn streets last week.

The Coldwell Lawn Mower Co., Newburgh, N. Y., the largest manufacturers of horse-drawn lawn mowers in the country, are preparing to put motors on their mowers. Many a fine lawn is badly damaged by the hoofs of the horse whenever the work of grass cutting is done and the Coldwell company is satisfied that the motor lawn mower will be hailed with delight by all owners of fine lawns and grass plots.

—From *The Horseless Age*, August, 1896.

apolis, Ind.; L. E. Russell, Peters & Russell, Springfield, Ohio; H. E. Zink, Dodes-Zink Manufacturing Co., Fremont, Ohio; Fred C. Tams, Globe Specialty Co., Chicago; S. M. Dover, Do-Ray Lamp Co., Chicago; John Carmody, Lion Chain Co., Chicago; R. H. Chrigwin, New Haven Clock Co., New

Haven, Conn.; Maury S. Mittelman, Faith Manufacturing Co., Chicago; B. Rosenberg, Templar Products Co., New York City; M. Portnow, Dura Electric Lamp Co., Newark, N. J.; A. Cohn, Coliseum Battery Co., Chicago; and A. E. Storey, Associated Refineries, Chicago.

Goodyear May Drop Night Shift

*Unless Labor Peace Assured, Akron Schedule Will Be Cut;
Company Reported to Hold Option on Jackson Plant*

Total net sales of the Goodyear Tire & Rubber Co. for the first half of 1936 jumped more than \$12,000,000 over the same period of 1935 with an increase of more than \$1,000,000 in net profits, company officials announced at a directors' meeting in Akron Aug. 17. Officials made no comment as to whether or not the directors had decided to act upon the Goodyear option of a large steel plant in Jackson for the purpose of equipping it to produce 10,000 tires daily, nor was any comment forthcoming on the report Goodyear was negotiating for a plant in Windsor, Vt.

Goodyear closes its Akron factories from Aug. 29 to Sept. 8 for employee vacations. It is being strongly rumored that unless labor peace is accomplished before the plant reopens, the company may drop its fourth or midnight shift on which most of the labor friction has occurred during the past several months. Goodyear now has at least 30,000 daily tire producing capacity outside of Akron, with an Akron schedule calling for 45,000 tires per day. A 75,000 per day capacity means a potential capacity in excess of 20,000,000 casings per year. Last year Goodyear produced domestically slightly more than 12,000,000.

Sales in the first half of 1936 were \$90,908,684 and net profits were \$3,598,683, compared with sales of \$78,828,358 and profits of \$2,404,777 in the first half of 1935. The company recently terminated its Sears Roebuck tire contract under which it was making between 6000 and 8000 private brand Sears tires per day.

Argentine Touring Club Seeks Tariff Reduction

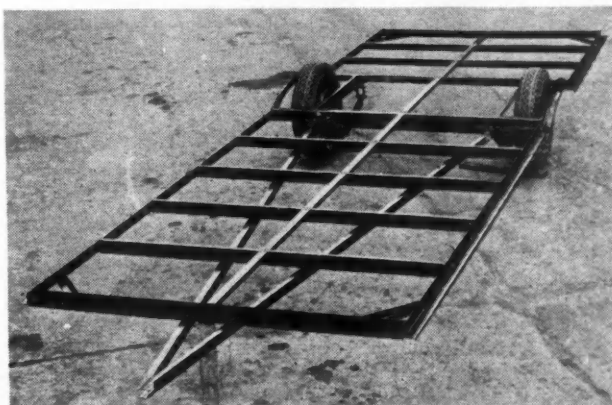
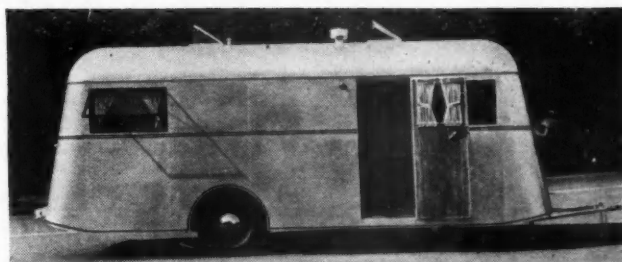
The Argentine Touring Club has submitted a petition to the Minister of Finance asking the elimination of the

customs surcharge of 10 per cent which is now imposed upon all imports of automobiles, trucks, and parts, according to a report from Trade Commissioner DuWayne G. Clark, Buenos Aires, to the Commerce Department.

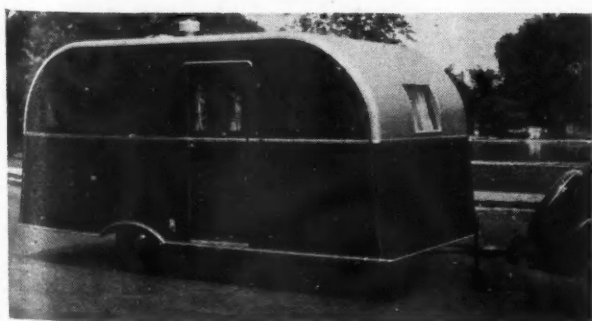
This 10 per cent surtax, which amounts to a supplementary duty in addition to the charges under the regular customs schedule, was placed in effect Oct. 6, 1931, by the then provisional government. The purpose of the surtax was to increase the Government's revenue, the report states.

The Touring Club holds that there is no justification for the continued imposition of this 10 per cent surtax.

Pierce-Arrow's new
Travelodge tourist
trailer



Chassis frame of
the Federal Moto-
home and Moto-
mart trailers is all-
steel, electrically
welded into one
piece.



Standard model of
the Federal Moto-
home.

July New Truck Sales May Break All Records

Sales of new trucks and commercial cars in the United States during July were estimated by R. L. Polk & Co. at 62,000 units, with the possibility seen that when all registrations for the month are in, the all-time record of sales in one month, 64,961 in April, 1936, may be exceeded. The largest July sales in history were in 1929 with 57,943 units.

The 62,000 estimate is based on complete registrations in 21 States containing 34.24 per cent of the nation's commercial vehicles. In these States 21,694 units were registered in July, an increase of 23.65 per cent over 17,544 in July, 1935, and an increase of 26.50 per cent over 17,150 in June, 1936.

The Polk estimate of passenger car sales for July remains unchanged at 350,000 units, although this total is now considered conservative on the basis of complete registrations received from 21 States, containing 29.91 per cent of the passenger cars in the United States. In these States 103,353 units were registered in July, an increase of 21.03 per cent over 85,396 in July, 1935, and an increase of 4.86 per cent over the 98,564 which were registered in June, 1936.

Tests Reveal Dirty-Plug Waste

A series of tests recently completed by the engineering department of the University of Michigan to determine waste caused by badly worn and dirty spark plugs, show that out of every 10 gals. of gasoline used they waste more than 1 gal.

The average mileage from cars equipped with clean plugs was 18.68 mi. per gal., against 16.75 mi. per gal. when the plugs were dirty and badly worn.

Buying Power of Readers Governs Choice of Media

What are the most important factors in choosing newspapers for automobile campaigns? This question was asked 110 men directly concerned with placing automobile advertising, and in the opinion of the 50 per cent who replied, according to the New York Times, buying power of readers, volume of circulation, and the newspaper's prestige and influence are the most important factors. The entire list of factors, and the percentage checked by company and agency executives, follows:

	Per Cent
Buying power of readers.....	88
Volume of circulation.....	73
Newspaper's prestige and influence.....	72
Editorial character.....	42
Position in automotive advertising.....	42
Milline rate.....	38
Local dealer recommendation.....	26
Position in total advertising lineage.....	23
New-car buying as revealed by surveys.....	19
Publicity.....	19
Position in retail advertising.....	17
Position in national advertising.....	15
Upward trend of circulation and advertising.....	11
Specific advertising result stories.....	8
Zone manager recommendation.....	8
Free promotional service.....	2

Lincoln Electric to Handle The Messer Oxygen Machine

J. F. Lincoln, president and general manager of the Lincoln Electric Co., Cleveland, has just returned from a business trip to Germany where he completed negotiations with the Messer Co., Frankfurt on Main, Germany, for representation in the United States. The Messer company are the designers and patentees of a low priced automatic oxygen machine whereby users of oxygen for cutting and welding by the acetylene process can produce oxygen in their own plant at low cost. Due to the low first cost and economical operation it is believed that this equipment will be of great interest to plants who use as little as 500 cu. ft. of oxygen per day.

June Tire Shipments Up 36% Over Year Ago

Shipments of pneumatic casings during the month of June are estimated at 5,792,319 units, a decrease of less than 1 per cent under May and 35.9 per cent above shipments made in June, 1935, according to statistics released by

the Rubber Manufacturers Association, Inc., today.

This organization estimates production of pneumatic casings for June at 5,609,789 casings, an increase of 12.9 per cent over May and 43.5 per cent above June, 1935.

Pneumatic casings in the hands of manufacturers, June 30, 1936, are estimated at 7,832,911 units, a decrease of 4.2 per cent under the stocks on hand May 31, and 27.2 per cent below stocks on hand June 30, 1935.

Consumption of crude rubber by manufacturers in the United States for the month of July is estimated to be 48,127 long tons, which compares with 52,636 long tons for June. July consumption shows a decrease of approximately 8.6 per cent under June, but it is 34 per cent above July a year ago, according to statistics released by the Rubber Manufacturers' Association. Consumption for July, 1935, was 35,917 (revised) long tons.

APEM Comparison Figures

Original equipment comparison figures for the four-week period ending June 27, 1936, have been issued by the Automotive Parts and Equipment Manufacturers, Inc., and are as follows:

48 Original Equipment Plants

	Report for 4-week period ending		
	June 29 1935	June 27 1936	May 30 1936
Employment Index—40 Hour..	83.4	101.0	104.5
42 Hour..	94.0	110.7	108.7
Production Index—40 Hour....	58.0	77.1	82.6
42 Hour....	62.2	83.3	81.0
Factory Rate per Hour.....	66.4	68.5	68.1
Male 40 hr.	69.3	71.7	71.7
Female 40 hr.	49.3	50.3	49.8
Male 42 hr.	74.0	76.9	76.5
Female 42 hr.	47.7	49.9	48.6
Average Hours per Week:			
(entire factory)—40 hr.	35.1	38.7	40.0
42 hr.	38.2	43.5	43.1
Male 40 hr.	34.0	39.0	40.1
Female 40 hr.	39.8	37.6	39.7
Male 42 hr.	38.3	43.6	43.1
Female 42 hr.	32.7	39.2	38.9
Average Weekly Earnings:			
(entire factory)	23.76	27.07	27.64
Male 40 hr.	23.59	27.96	28.79
Female 40 hr.	19.64	18.92	19.78
Male 42 hr.	28.40	33.47	33.00
Female 42 hr.	15.63	19.54	18.92
Total Factory Payroll:			
(Millions of Dollars)	5.300	7.267	7.611
Automobile and Truck Production Index.....	June 1935 79.5	June 1936 100.6	May 1936 102.7

No Pickle Workers

(Continued from page 231)

its management pending investigation.

Ellsworth Kramer, president, who is an independent candidate for sheriff, is a target of Mr. Ramsey, who charges that the local has been turned into a political machine and has distributed membership lists for campaign purposes. He declares that "unless the present set-up is changed we are very much afraid that the local will become only a memory."

Eleven particulars were set up in charges against executive board members, nine against President Kramer, five against Fred Schwake, business agent, and ten against Howard McLaughlin, trustee and chairman of the shop committee of the City Auto Stamping Co.

Use of the union to organize pickle workers, bread-wagon drivers and gas station employees was scored as bringing the organization into disrepute in the community.

Mr. Ramsey was leader of the Electric Auto-Lite strike of two years ago. In recent years he has been waging a battle against Communists within the ranks of the auto workers.

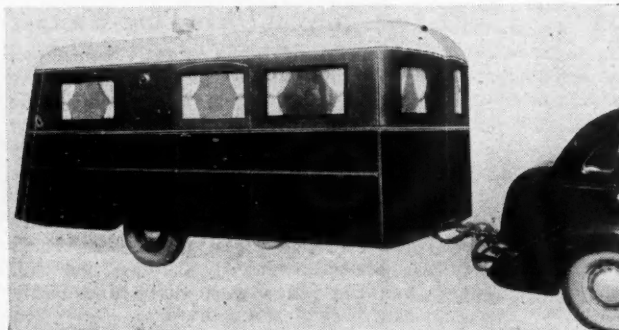
The U. A. W. will launch a membership drive in Pontiac on Sept. 2, when a mass meeting will be held at which Frank Murphy, Democratic candidate for Governor of Michigan, will be the principal speaker. The union has adopted a new plan of taking new members in plants not organized, which they claim is working very well. The system involves signing up members and not pulling them into locals until they have sufficient strength in a plant to do so without jeopardizing the jobs of the workers who sign up. In other words, members are signed up surreptitiously. They are kept posted on union activities and are permitted to attend any local they wish. All correspondence going to them is in plain envelopes. This, union officials say, is done to avoid discrimination on the part of employers which they say has been the experience when they break into an unorganized plant. The U.A.W. membership drive so far is claimed to have brought in 10,000 workers who were previously not unionized. Officials say that every local has reported an increase in membership.

Plants Rush Retooling

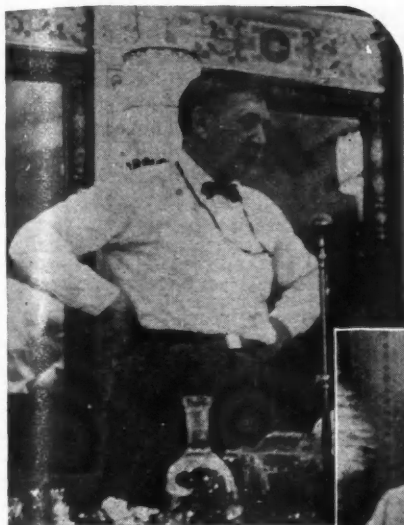
(Continued from page 231)

is also an all-time record for the company and an increase of over 27 per cent over 1935.

Chevrolet truck sales are nearly 20,000 units higher for 1936 to date than they were in the same period of 1929, the previous record truck year, it is stated by W. E. Fish, Chevrolet commercial car and truck manager. The company reports deliveries of 140,271 trucks up to the end of July this year, against 120,355 in the same 1929 period.



"Safety-Steel" tourist trailer now being built by the Hayes Body Corp.



(Above) W. S. Knudsen, executive vice-president of General Motors

Two GM Events of a Week

Corporation is Honored at Great Lakes Exhibition and Holds Chevrolet "Soap Box Derby" in Akron

At Cleveland



(Above) Lawrence P. Fisher, (left) G.M. vice-president and Edward Fisher, general manager of Fisher Body

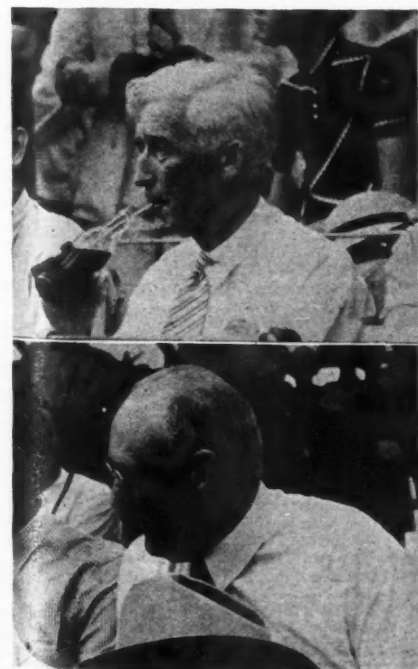


(Left to right) C. P. Simpson, Pontiac general sales manager; Harley Earl, head of GM art and color section; George W. Codrington, pres. Winton Engine Co.

Candid photographs by Don Blanchard

(Below) Gar Wood watches the Akron Soap Box Derby

M. E. Coyle, Chevrolet president, is an interested spectator at Akron



General Motors Day was celebrated at the Great Lakes Exposition in Cleveland on Saturday, Aug. 15. The event drew a representative group of major G.M. executives, including W. S. Knudsen, C. F. Kettering, L. P. Fisher, Edward Fisher, M. A. Coyle, J. W. Dineen, Harley Earl, C. P. Simpson and Frank A. Berend.

Speakers at the luncheon held in connection with the event included Mr. Knudsen and Mr. Kettering with Lincoln Scaife, manager of the local Fisher Body plant, presiding. Nineteen-thirty-seven will be at least as good a sales year as 1936, Mr. Knudsen said, adding that R. H. Grant, who is in Europe, expected a 10 per cent increase.

On the subject of employment, Mr. Knudsen said that much had been accomplished toward stability, but that he felt a still better job can be done. In this connection he revealed that at the peak of production the corporation had 277,000 employees of which 230,000 were in this country.

In conclusion, he outlined a six-point G.M. creed. He placed quality first and cost second, adding that so long as the corporation can build cars a half cent per pound cheaper than competition, its place in the sun is secure. Next he mentioned good plants and equipment; then safety and health of employees; a good wage scale and steady employment.

(See page 232 for "Soap Box Derby.")

At Akron

(Left) C. E. McTavish, sales manager G.M. of Canada, congratulates Norman Neumann, contestant from Pretoria, S. Africa

(Below, left) C. P. Fiskien, Chevrolet advertising manager, cheers up a lost boy

(Below, left to right) Harry Hartz, C. P. Fiskien and "Wild Bill" Cummings



Automotive Metal Markets

Copper Producers Hesitant on Further Rise; Steel Men Feel Out Market for New \$2 Price Increase

By William Crawford Hirsch

Those who foot the bill when metal prices advance found some encouragement in the hesitancy displayed this week by the copper market in staging another rise. The scenery was all set for a ¼-cent per lb. rise to 10 cents, when one of the large producers let it be known that he would adhere for the time being to the 9¼-cent price, preferring the possibility of increased sales and production to an immediate price rise. Copper is still selling at considerably below the average of the seven pre-depression years and an advance would not at all be out of line with the general commodity level. The conservative attitude of one of the important factors in the market, even though this may mean only a deferring of the advance, is, therefore, cheering to consumers.

With feelers as to what reception would be accorded to another \$2-per-ton advance in the steel market, thrown out early last week, observers are keen-

ly watching consumers' reactions to the plan. It is pointed out that new model car selling prices have been tentatively set on the basis of prevailing material costs.

When the recent \$2-per-ton advance was put across, there was much talk in the steel market that this would have so little effect on the per unit cost of automobile manufacturers that little resistance to the advance on the part of automotive consumers need to be apprehended. It was said that representative buyers had been sounded out, and that the advance was not decided upon until the steel producers felt reasonably safe in going ahead.

Whether such tacit assent will be accorded to a further price advance at this time remains to be seen. Fireworks in the scrap iron market con-

tinue to feature news from the Middle West. Steel mill purchasing agents, past masters in reading aright the meaning of speculative maneuvers in this field, refrain as much as possible from competing with one another for supplies, and there are already indications that holders of heavy accumulations here and there are beginning to liquidate on the quiet.

Pig Iron—Shipments of Lake Superior iron ore by lake up to Aug. 1 ran 50 per cent ahead of last year's figure. Pig iron buying by automotive foundries against 1937 model requirements is still largely in abeyance.

Aluminum—Steady and quiet.

Copper—Slightly easier export prices were reflected in lessening of the tension in the domestic market. Covering in anticipation of a possible advance abated, custom smelters, however, restricting sales at 9½ cents to their intake.

Tin—News from Penang that restriction negotiations with Siam, although proceeding on a friendly basis, could hardly be looked for to terminate in an understanding in the next few weeks, caused the market to turn cautious, with spot Straits tin quoted at the beginning of the week at 42 cents, ½ cents down from the previous close.

Lead—Storage battery manufacturers are reported to be well covered over the next six weeks, and the market rules quiet and unchanged.

Zinc—Firm and unchanged.

Calendar of Coming Events

SHOWS

- Automobile Salon, Oriental Fair, Lwow, Poland Sept. 5-15
International Automobile Section, 7th Levant Fair, Bari, Italy Sept. 6-21
30th Automobile Salon, Paris, France, Oct. 1-11
Olympia Motor Show, London, England, Oct. 15-24
Czechoslovakia, 26th International Automobile Exposition, Prague Oct. 16-25
9th International Automobile Salon, Milan, Italy November
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7
Canadian National Automobile Show, Toronto Nov. 7-14
National Automobile Show, Grand Central Palace, New York Nov. 11-18
Scottish Motor Show, Glasgow Nov. 13-21
International Aviation Show, Paris, France Nov. 13-29
Columbus Automobile Show Nov. 14-20
Boston Automobile Show Nov. 14-21
Buffalo Automobile Show Nov. 14-21
Chicago Automobile Show Nov. 14-21
Detroit Automobile Show Nov. 14-21
Washington, D. C., Automobile Show, Nov. 14-21
Cincinnati Automobile Show Nov. 15-21
St. Louis Automobile Show Nov. 15-22
Philadelphia Automobile Show Nov. 16-21
Pittsburgh Automobile Show Nov. 16-21
Brooklyn Automobile Show Nov. 21-28
Cleveland Automobile Show Nov. 21-28
Montreal Automobile Show Nov. 21-28
Kansas City Automobile Show Nov. 21-29*
Milwaukee Automobile Show Nov. 22-29
Baltimore Automobile Show Nov. 26-Dec. 5
28th Automobile Salon, Brussels, Belgium Nov. 28-Dec. 9
Peoria Automobile Show Nov. 30-Dec. 5*
Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City Nov. 30-Dec. 5
Automotive Service Industries Joint Show, Chicago Dec. 9-13
Illinois Automotive Ass'n, 4th Annual Show and Maintenance Exhibit, Navy Pier, Chicago Apr. 24-28, 1937

CONVENTIONS AND MEETINGS

- National Association Power Engineers, Annual Meeting, Chicago, Aug. 31-Sept. 4
American Chemical Society, Semi-annual Meeting, Pittsburgh, Pa., Sept. 7-12

* Tentative dates.

- World Power (Fuel) Conference, Washington, D. C. Sept. 7-12
American Gear Manufacturers Association, 19th Semi-annual Convention, aboard SS. Seandee, sailing Chicago to Cleveland Sept. 8-10
Annual Meeting and Convention of the National Association of Sales Finance Companies, Hot Springs, Va. Sept. 14-16
American Society of Mechanical Engineers, Niagara Falls Meeting, Schenectady and Niagara Falls, Sept. 16-19
American Transit Association Convention, White Sulphur Springs, W. Va. Sept. 21-24
North American Gas Tax Conference, Richmond, Va. Oct. 6-9
5th Nat'l Road Oil and Asphalt Congress, Tulsa, Okla. Oct. 8-9
Annual Meeting of the National Association of Motor Bus Operators, Detroit, Mich. Oct. 15-16
First Aircraft Production Meeting of the S. A. E., Los Angeles Oct. 15-17
American Trucking Associations, Inc., Third Annual Convention, Chicago, Oct. 19-21
American Society for Metals, 18th Nat'l Congress, Cleveland, O. Oct. 19-23
16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23
American Gas Association, Annual Meeting, Atlantic City Oct. 26-31
American Foundrymen's Ass'n Conference on Foundry Practice, Univ. of Iowa, Iowa City, Ia. Oct. 30-31
American Petroleum Institute, Annual Meeting, Chicago Nov. 9-12
National Foreign Trade Convention, Chicago Nov. 18-20
16th Annual Meeting, Highway Research Board of the National Research Council, Washington, D. C. Nov. 18-20
International Acetylene Assn., 37th Annual Convention, St. Louis, Nov. 18-20
Natl. Industrial Traffic League, Annual Meeting, New York City Nov. 19-20

CONTESTS

- 100-Mile National Championship, New York State Fair, Syracuse Sept. 12
First Annual 400-Mile International Sweepstakes, Roosevelt Raceways, L. I. Oct. 12
500-Mile International Sweepstakes, Los Angeles Raceway Nov. 29



Engineering Experiment Station, Lafayette, Ind.—Report of the Research and Extension Activities of Engineering Schools and Departments for the sessions of 1934-5.

National Bureau of Standards, Washington, D. C.—Thermal Expansion of Copper-Beryllium Alloys, by Peter Hidnert.

National Board of Fire Underwriters, 207 East Ohio Street, Chicago, Ill.—Supplement to list of gas, oil and miscellaneous appliances, June, 1936.

Thermoid, Trenton, N. J., has issued a catalogue of tractor products.* This catalogue covers the following products of the firm: bus and truck H.D. woven brake lining; brake lining on individual tractors; clutch facings, woven, molded, heavy-duty; clutch facings on individual tractors; fan belts; fan belts on individual tractors; F-M-L brake lining; radiator hose; radiator hose sizes on individual tractors, and universal-joint and coupling discs.

"The Strength and Elastic Properties of Cast Iron"—by W. J. Schlick and Bernard A. Moore—Bulletin 127 of the Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa, has been issued recently and is available without charge from the college. The new bulletin deals with the strength and elastic properties of cast iron in combined tension and flexure, as well as in tension, compression and flexure. A feature of the bulletin is an extensive bibliography of cast iron research and a review of literature.

"The Pacemaker for American Industry," the address delivered by Alvan Macauley, president of the Automobile Manufacturers Association and president of the Packard Motor Car Co., at the 23rd annual meeting of the association in Detroit, July 15, 1936, has been published in booklet form by the association.*

* Available from AUTOMOTIVE INDUSTRIES.

AUTOMOTIVE ABSTRACTS

A SYMPOSIUM on railcars was held before the Institution of Automobile Engineers in March. It comprised four papers, one on Compression-Ignition Engines for Rail Traction by H. D. Bush of William Beardmore & Co., Ltd.; one on Mechanical Transmission for Compression-Ignition-Engined Railcars by Major W. G. Wilson, director of Self-Changing Gear Trading Co., Ltd.; one on Railcars—Chassis and Bodywork, by J. C. Hyde Trutch of the Diesel-Traction Department of Sir W. G. Armstrong, Whitworth & Co., Ltd., and one on Railcars—Their Effect on Public Transport and Railway Operation, by J. S. Tritton, partner in the firm of Rendel, Palmer & Tritton, consulting engineers.

Mr. Bush gave the following particulars regarding the wear of different parts of compression-ignition engines used in rail service. Under normal working conditions the engine should complete not less than 16 years service with less maintenance costs than those of a steam locomotive performing a similar duty. Table I shows the approximate mileage of the respective parts in relation to wear.

TABLE I

Component	Mileage
Crankshaft	Crankpins wear 0.005 in. and journals 0.003 in 150,000 miles
Connecting-rod bearings	Renew after 120,000 miles
Crankshaft bearings	Renew after 500,000 miles
Cylinder liners	Regrind after 170,000—200,000 miles and fit oversize piston
Pistons	Renew after 170,000—200,000 miles
Piston rings	Renew top ring after 75,000 miles; renew other rings after 85,000 miles, scraper rings after 150,000 miles
Fuel-pump plunger and liner	Renew after 150,000 to 200,000 miles
Exhaust valves and guides	Renew after 140,000 to 180,000 miles

The connecting-rod bearings of the earlier engines gave varying results in service, and it was found that after 60,000 to 70,000 miles the white metal of the bearings on some of the engines showed defects in the form of small cracks, which commenced about 90 deg. apart and developed into a patch around the crown of the bearings. The metal ultimately became detached from the shafts, which involved changing the bearings after every inspection. The exact cause of these bearing failures is not known, but it appears that the natural frequency of the car, coinciding with the pressure rise in the cylinder, may have contributed to it. This causes a stress wave or series of waves through the connecting rod, setting up vibrations in the rod equivalent to its natural frequency, with a node located at the crank bearing and heavy stresses. The trouble was ultimately overcome by employing a plastic metal with a high percentage of lead, a lead-bronze shell, and improved methods of manufacture.

By way of illustrating the reliability of the compression-

ignition engine in traction service, the author gave the records of eight cars out of 28 in service on the Canadian National Railways, each of which is fitted with a 200-hp. engine running at 750 r.p.m. Four of the engines were placed in service in 1925, three in 1926 and one in 1929. The mileages completed to the end of October, 1934, ranged from 251,486 to 531,544. The miles covered per year by each railcar ranged from 34,610, to 53,100 and averaged 40,600; the average equipment availability from the beginning of service ranged from 81 to 90 per cent and averaged 85.7 per cent; the specific fuel consumption in gallons per 1000 ton-miles ranged from 3.13 to 4.40, the average being 3.43. (The gallon undoubtedly is the Imperial gallon and the ton the long ton, so if it is desired to be converted to United States gallons per 1000 short ton-miles it is necessary to multiply the gallon figures by 1.07). The mileages per Imp. gallon of lubricating oil (1.2 U. S. gal.) ranged from 40.3 to 87.56, the average figure being 62.8. Variations in the fuel consumptions are due to differences in the trailing loads and average speeds, while variations in lubricating oil consumption are due to differences in the relative periods of idling, piston wear, renewal of oil, etc.—*Journal of the Institution of Automobile Engineers.*

* * * *

Wind-Tunnel Tests on Bus Models

A NUMBER of models of motor omnibuses were subjected to tests in the wind tunnel of the Stuttgart Technical College. The models were built to a scale of 1:10 and the air velocity in the tunnel was 70 m.p.h. In the design of the models care was taken to produce forms that could be practically executed. The wood models were lacquered and the window openings were suitably recessed. The passage of cooling air through the interior of the vehicle was taken account of by making the models hollow, and the radiator was represented by a piece of wire gauze. Air escaped from the model through the bottom behind the engine location. Otherwise the models were closed at the bottom, but the differential housing and the front axle projected from the bottom of the body. Tests were made on double, inverted models so as to take account of the effect of the proximity of the road surface in road vehicles. Measurements were made of the tangential forces, the normal forces and the moments for 25 different angular positions of the models, from - 45 deg. to + 45 deg. In addition the lifting forces were measured. In the original article drawings of the models are reproduced and the wind-tunnel measurements are given in tabular form.

It was found that an important part of the normal air resistance is due to the flow of the cooling air through the interior of the body. In numerous tests on models of racing cars, made in 1933 in connection with the development of the Auto-Union racer, the favorable influence of suitable conduits for the cooling air became quite plain. In that case the cooling air was led through a smooth-walled passage of small area, instead of through narrow louvers and around sharp corners. Following the example of the N.A.C.A. cowling for air-cooled aircraft engines, the air was discharged tangentially into the outside air stream.

(Turn to page 255, please)

Engine Block Design

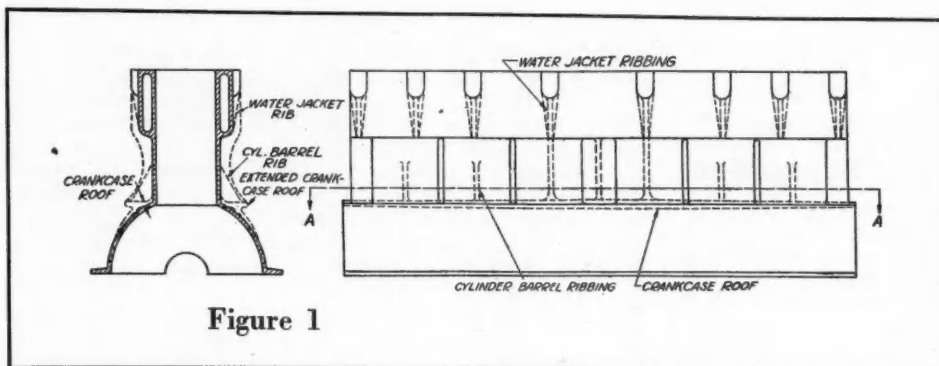


Figure 1

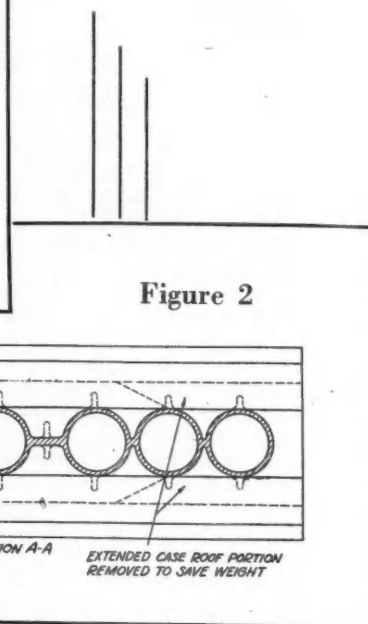


Figure 2

By D. Gerdan*

OWING to inherent difficulties in determining transverse vibration characteristics of the complicated engine structure, the design of the cylinder and crankcase cannot be based on mathematical analysis. A careful study of the practical aspects of the problem is necessary.

The function of the cylinder and case—the engine block—is not an active one. It is purely a supporting structure, designed to keep the moving parts of the engine in their proper relation to each other. The need for compactness and minimum weight adds to the difficulties of the design problem.

We all know that a reduction in engine length results in increased stiffness and decreased weight. The shorter crankshaft is less susceptible to vibration; the shorter crankcase also is stiffer, and the lengths of unsupported thin crankshaft walls between bearings are cut down. It is therefore important to make the engine as short as possible consistent with efficient operation. This does not mean that it is desirable to omit jacket space between adjacent cylinders.

The stiffness of the cylinder block is a direct measure of its resistance to vibration. Designing rigidity into a structure is not a particularly difficult problem. Stiffness is easily obtained by even the random use of a large amount

of material. But to obtain maximum results with a limited amount of material is an entirely different matter. The ratio of stiffness to weight is a criterion of the efficiency with which material is being used in any design in which rigidity is an important consideration. This ratio can be expressed as the load per unit of weight of the engine block required to produce a given deflection. Naturally, the stiffness-weight ratio is the most important gage of the design efficiency of the block. The necessity of determining the various factors contributing to a high stiffness-weight ratio has been recognized for several years by many engineers. These factors are listed below as nearly as possible in the order of importance of their effects on this ratio:

1. Thickness of crankcase roof.
2. Method of ribbing crankcase roof.
3. Length of water jacketing.
4. Width and thickness of oil-pan flange.
5. Ribbing of water jackets.
6. Method of tying main bearings to crankcase.

Neglect of any one of these points may quite possibly be the difference be-

tween a good design and a poor one.

To make clearer the effect of these various factors, let us start with an elementary conception of the engine block. As shown by Fig. 1, it is essentially a group of vertical cylinders mounted on a horizontal half-cylinder. To strengthen this primitive engine block against the couple made up of the piston side thrust and the main bearing horizontal force, it is necessary to start at the weakest point. Deflection tests have shown this to be at the junction of the cylinders and crankcase. This roof has metal added to it as shown by the dotted line. To make the best use of the material so added, the section is made heaviest at the center of the roof and tapered lengthwise, as shown by the side view in Fig. 1. The extension of the internal roof outwards, so that it forms a horizontal rib along the length of the case, has been shown to be of considerable help in giving increased stiffness to the structure. Tests have shown that the need for this rib is greatest at the center of the engine. This extended roof is then cut down as shown in Fig. 2, so that no material is used which does not contribute to in-

*Discussion of an S.A.E. Paper on Engine Roughness, by P. M. Heldt. Slightly condensed.

with full-length water jacket and box-girder type of support for bearings found to have increased rigidity. Roof of crankcase can be reinforced to minimize transverse vibration.

creasing the stiffness-weight ratio.

To further stiffen the block, the cylinders are tied to the crankcase by ribs extending from just below the water jacket to the outer edge of the extended case roof. To keep down the weight, these ribs are used only on the center cylinders. For the others the ribs are made much shorter, not extending up to the bottom edge of the water jacket. Generous fillets at the bottom of all cylinders increase the rigidity materially. If the cylinder barrels extend into the crankcase, they should be tied to the roof by ribbing. Here, too, more metal should be used for the center cylinders. By properly attending to the points mentioned above, great gains can be made with respect to rigidity per pound of material used.

During the past year several manufacturers have adopted full-length water jackets. It is not necessary to

repeat here the benefits accruing from this measure. But there is one point which generally has been overlooked, in spite of its obvious importance, and that is the considerable increase in stiffness which the addition of a small amount of material will afford. In one design, after an increase of 2 per cent in the amount of metal used, deflection tests disclosed an increase of 29 per cent in stiffness. The reason for this is brought out by a study of Fig. 3. Full-length water-jacketing gives two walls at the level of the crankcase roof, which withstand the effect of the couple previously mentioned. It is quite apparent that two walls make a more rigid structure than the single wall of a partially jacketed block. Here is one of the many paradoxes met with in engine design. Extending the water jacket downward, instead of increasing the total weight, may actually decrease it.

This is so because it is now possible to remove the outwardly-extended case roof without loss of rigidity.

As shown by Mr. Heldt, the horizontal forces at the main bearings are best met by strengthening the case in the horizontal plane of the crankshaft axis. It is true that adding metal to the oil-pan flange, in this plane, does stiffen the block. But, contrary to the inference in Mr. Heldt's paper, this is not the most important place. It is just one of the many details to be considered in the stiffening of the entire structure. That it is an important detail is granted, but the material used here does not go far in increasing the stiffness-weight ratio. Here, as in the other places considered, there is an economical method of using material. It is better to widen the flange rather than to thicken it. The flange thickness need not be much greater than is necessary to securely hold the threads of the screws supporting the oil pan. It is only by actual deflection tests that the best width of the flange can be determined.

The use of deep crankcases with double flanges, one at the crankshaft axis and the other at the bottom of the case, results in a gain of rigidity without doubt. But in very few cases is the stiffness-weight ratio increased. Instead, it usually falls, thus showing that metal was not added at the proper place. It would be far better to cut the case off at the crankshaft axis and distribute the metal thus removed at other places in the cylinder block. Referring to Fig.

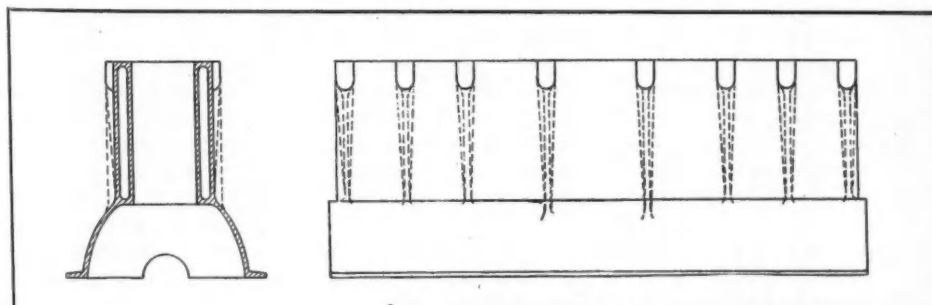


Figure 3

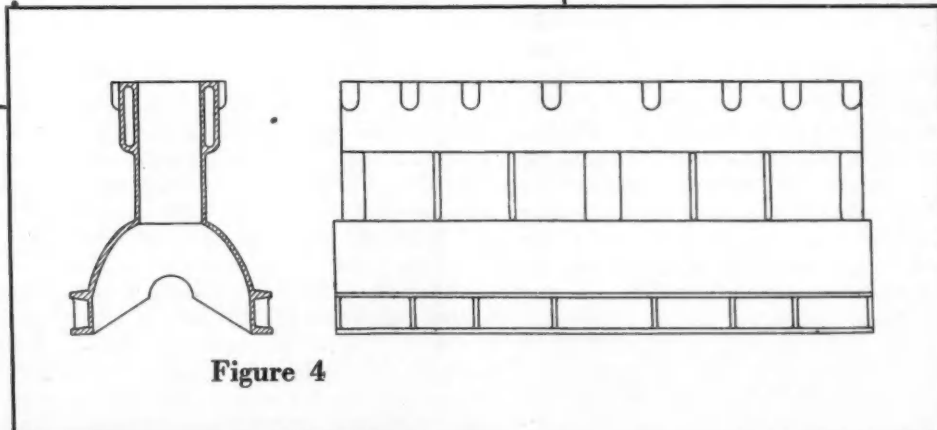


Figure 4

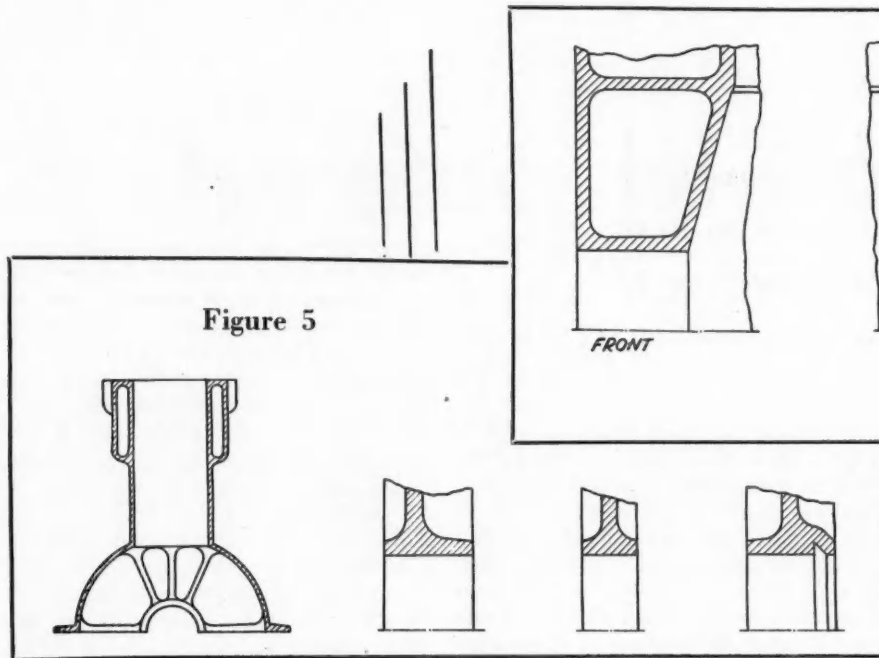


Figure 5

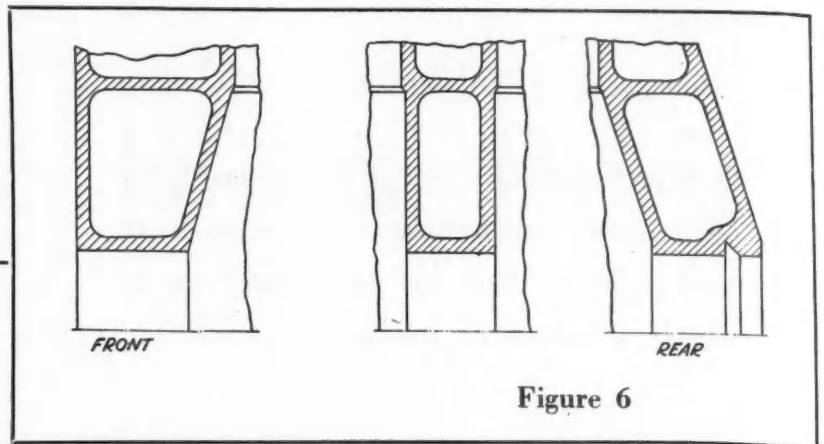


Figure 6

4, it can be readily seen how much metal must be added to obtain the deep case with the double flange. First there is the downward extension of the crankcase wall, and then the addition of another flange. Also, there are usually several vertical ribs joining the two flanges together. Then, to better tie the main bearings to the walls of the case, the webs from the bearings to the walls are brought down as shown in the figure. All this does result in increasing the force required to produce a given deflection, but it also results in a decrease of the stiffness-weight ratio. This is due to the greater proportion of material required. In three designs investigated, two with the double flange and one with the usual single flange at the crankshaft axis, the shallow case was about 6 per cent stiffer, based on the stiffness-weight ratio. Its total weight was about 20 per cent less than that of either of the other designs.

The fifth of the factors influencing stiffness is ribbing of the water jackets. This is rather difficult to discuss in other than very general terms. Deflection tests are the only means of finding the effects of the location, width and thickness of ribs. Generally, aside from the ribs extending from the cylinder-head bolt bosses down the sides of the jacket, the only ones needed are those extending upward from the case roof level at the center lines of the center cylinders. Sometimes it may be found necessary to break up the flat surfaces presented by a full-length water jacket in order to prevent resonance effects. This can be done by the use of shallow horizontal and vertical

A cylinder block might be as rigid as a concrete floor, but it would still be unsatisfactory if crankshaft bending occurred due to main-bearing deflection. The main bearings must be as rigid as every other part of the cylinder and case. The webs by which the bearings are tied to the crankcase wall and held in true relation to each other must be carefully designed to prevent deflection in any direction. Here, too, the wasteful use of metal is a common fault. Much material can be used in webs and ribs without appreciable gain in stiffness. The nature of the webbing used should depend upon the length of the bearing. Main bearings of most passenger-car engines in use today are short. The support for these narrow bearings must be of the simplest nature, mainly on account of space limitations. It consists of a fairly heavy web in the center plane of the bearing, as in Fig. 5. This flange transmits the bearing loads to the remainder of the case. To better perform this function, these flanges are ribbed at the bottom of the case and are also ribbed to tie the main bearings to the case roof. These ribs generally meet the roof as in Fig. 5. The use at all junctions of as large radii as clearance allowances permit will greatly aid in securing additional stiffness. Where relatively long bearings are used, box-section webs support and distribute the loads with the most economical use of material. Fig. 6 illustrates the manner in which a box section web is used. This section adds to the rigidity of the entire structure, since it distributes the bearing load over a considerable area of the crankcase. Here, too, as with narrow bear-

ings, the stiffness at the junction of the webs and case walls and case roof can be increased by the use of as large radii as possible.

The original object in extending the crankcase below the crankshaft axis was to increase the vertical rigidity, which was particularly low where the crankcase was cast separately and of aluminum. Now that cylinders and crankcase are practically always cast in a single block, and especially where the water jacket extends all the way down to the crankcase, the vertical rigidity of the block is quite ample even if it does not extend below the crankshaft axis, and we may therefore expect to see a general reversion to the practice of parting crankcases in the plane of the crankshaft axis.

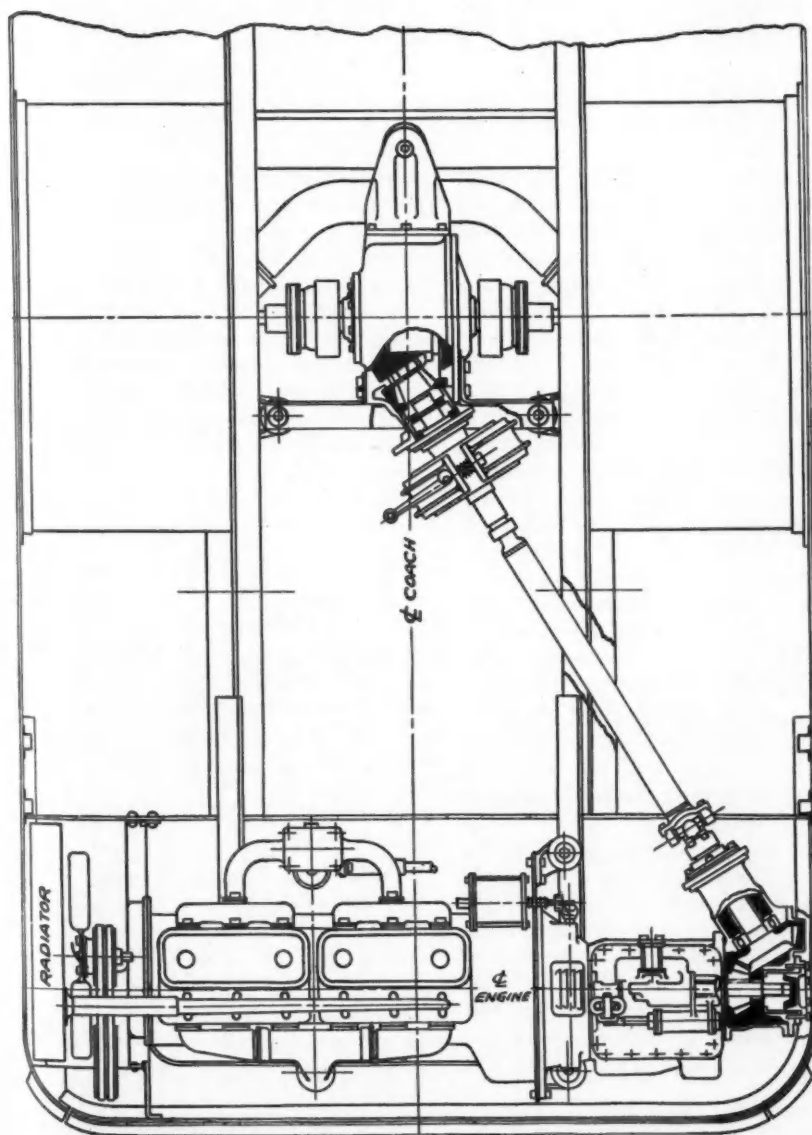
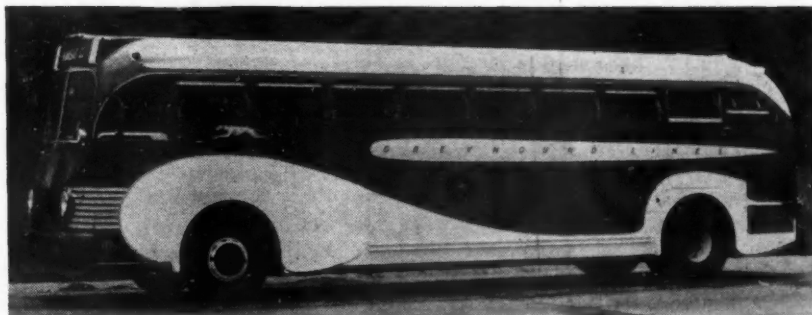
Mr. Gerdan's scheme of providing for transverse rigidity at the crankcase deck or roof, rather than at the crankshaft axis, is quite interesting and undoubtedly offers important advantages. Providing this rigidity in the plane of the crankshaft axis is made difficult by the requirement of large substantially rectangular openings for the crankshaft sweep. At the crankshaft plane we have substantially a horizontal plate with a number of large rectangular openings, while at the roof there is a similar horizontal plate with smaller circular openings, and it is obvious that the weakening effect of the circular openings is much less than that of the rectangular openings. As the bearings are very rigidly supported from the roof by partitions extending entirely across the crankcase, and by inclined ribs thereon, it is obvious that if the roof is sufficiently stiff transversely, the bearings will be held in line and there will be no serious transverse vibration of the crankcase, as the vibratory forces originate at the bearings.—P. M. H.

GMC Buses With Rear Engine Drive

*Latest Design Employs Angular Connections
At Transmission And Rear Axle*

REAR engine drive is the trend in bus development at General Motors Truck Co. The Greyhound Supercoach described in *AUTOMOTIVE INDUSTRIES* (June 15, 1935), has been changed slightly for current production. Outwardly the principal change is a different treatment of form at the front end.

The power plant, located in the rear, is set crosswise as illustrated. All accessory units including the twin muff-



flers are located on one side to permit ready accessibility. For major overhauls the entire engine may be rolled out on a dolly. Full mechanical drive with a conventional transmission is standard. An interesting feature of the drive is the connection from the transmission to the rear axle, shown by the schematic diagram.

The coach seats 36 passengers and carries luggage under the floor in sealed compartments accessible from the outside. The coach body is 96 in. wide and 33 ft. 1 in. overall length. Power is supplied by a GMC six-cylinder Model 707 engine with overhead valves, 5 in. bore by 6 in. stroke, and a 707 cu. in. displacement. It is rated 185 hp. at 2300 r.p.m. and develops 560 in. lb. torque at 1000 r.p.m. Total weight of the vehicle is 17,500 lb., considerably less than conventional vehicles of similar rating due to the use of aluminum and aluminum alloy structural members.

Another GMC development is the 75-passenger, double-deck bus of which 100 are being built for Chicago Motor Coach and 100 for the Fifth Avenue Coach Co. The upper deck stairway and entrance is on the inside directly back
(Turn to page 256, please)

(Above) The GMC Supercoach for Greyhound

(Left) Schematic diagram of Supercoach drive. Description of a similar arrangement appears on page 247.

Brakes, Bearings and Transmissions;

IN driving in hilly country, a good deal of difficulty is usually experienced in that as soon as the brakes are released on an up grade, the car begins to roll backward, and if the clutch is then engaged rather quickly to stop this backward motion, the engine is likely to be stalled. Various devices have been proposed to prevent a rearward motion of the car under such conditions, and one such device has been patented recently* by J. L. Gonard. This locks the car against backward motion whenever the shift lever is in any of the forward-speed positions or in the neutral position, but does not interfere with backward motion when the shift lever is in the reverse position. With a car provided with this device, the driver, when stopped on an up grade, can release both his hand brake and service brake, and also de-clutch for the purpose of changing gears, without fear that the car will start to roll backward down the hill.

As shown in the accompanying drawings, the device incorporates a pinion on the main drive shaft of the trans-

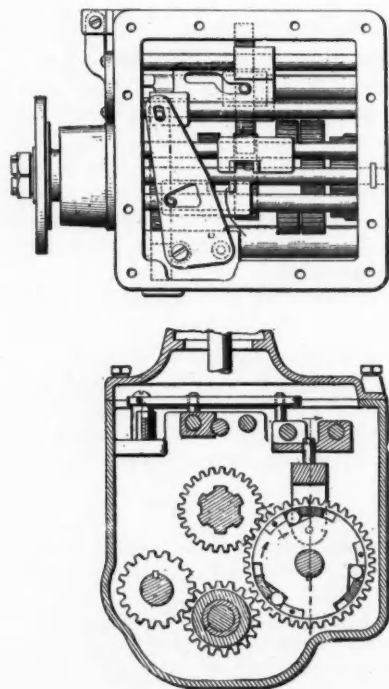
mission, within the transmission case, which is in constant mesh with a gear ring carried on a special shaft parallel with the main drive shaft. The gear ring is mounted on a stationary disk which is provided with notches on its circumference in which rollers are located. A portion of the surface of the notches is eccentric to the inner surface of the gear ring, and the rollers may wedge between the gear ring and the disk, thereby locking the gear ring to the disk against reverse motion. When the roller is in the deepest part of the slot it is out of contact with the gear ring and therefore is unable to lock the latter. The position of the roller relative to the disk is controlled by means of a cage capable of moving

the rollers angularly relative to the disk. The control mechanism comprises a pin extending upward into a slot in a control plate, which latter is connected to the shifting mechanism of the transmission. With the gear shift lever in the reverse position, the locking rollers are held in the deepest portion of the notches, so that they cannot engage the inner surface of the ring gear. With the shift lever in any of the other driving positions and in neutral, the roller cage is in such a position relative to the disk that the rollers may engage the ring gear, and engagement will take place as soon as the ring gear begins to turn backward, whereby further backward motion is prevented.

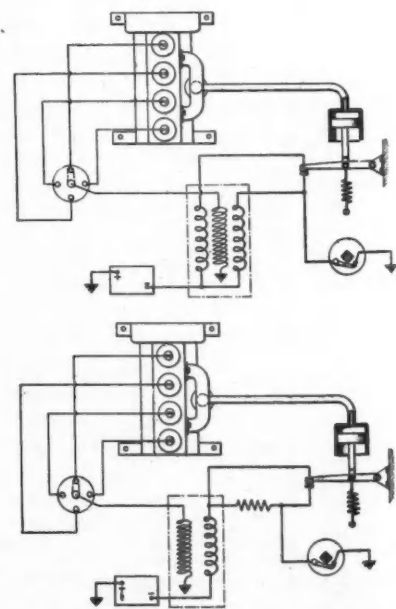
IT has been found that under certain conditions an engine will run reliably at ordinary speeds but will misfire when operating at high speeds with a relatively wide open throttle. Lester L. Beltz of Detroit, Mich., who has been granted a patent* on means for overcoming this difficulty, says it is particularly prevalent in engines in which liquid fuel containing lead compounds has been used. In such cases a coating of lead or lead compounds forms on the insulation of the spark plugs, and this coating, when heated to a high temperature, forms a good conductor for the electrical current and causes a substantial leakage thereof. Tests have shown that this misfiring at high speeds may be obviated by increasing the electrical energy in the ignition circuit.

In the system developed by Mr. Beltz, a vacuum chamber is provided which communicates with the inlet manifold. When the vacuum in the inlet manifold increases, owing to the throttle being partly closed, a piston is drawn into the vacuum cylinder and this piston is made to open a switch in the ignition circuit. One method of achieving the desired end is to provide the ignition coil with two primary windings. At normal speeds the switch operated by the vacuum cylinder is open and only one of the primary windings is active. If

now the throttle is opened and the inlet vacuum decreases, the switch is closed and the second primary winding is connected in parallel with the first, with the result that the energy of the ignition spark produced is increased. Instead of a second primary coil, a resistance in circuit with the single primary coil can be used, which is cut out when the throttle is fully opened and the inlet manifold is reduced in consequence.



Device to insure against rollback



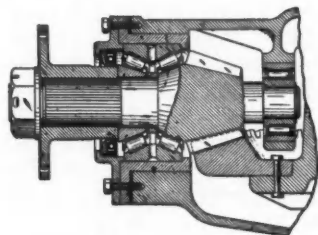
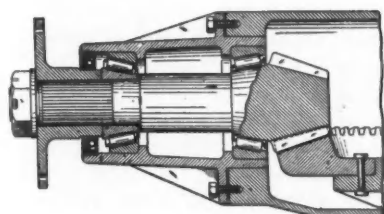
Details of the Beltz plan for better ignition

* No. 2,025,234. Device for Preventing Retrograde Movement of Vehicles. John Louis Gonard of Englewood Cliffs, N. J.

* No. 2,037,059. Lester L. Beltz, Detroit, Mich., assignor to Packard Motor Car Company.

Ignition, Headlights and Rear Axle

New Rollback Device Has Pinion On Transmission Drive Shaft Meshing With Gear Ring



Boden Bearings

IN the past, anti-friction bearings designed to take radial loads principally have been provided with inner and outer rings or races between which rolling members were inserted. In recent years this practice has been abandoned to a certain extent, particularly in connection with the so-called needle bearings, the needles frequently rolling directly on the shaft which they sup-

port. This principle evidently is applicable also to some other types of bearings, notably to cylindrical and tapered roller bearings, and Ernest G. Boden of Canton, Ohio, has been granted a patent* covering a design of pinion-shaft bearing for automotive

* No. 2,037,206. Ernest G. Boden, Canton, Ohio, assignor to The Timken Roller Bearing Company.

IN large buses the propelling mechanism usually occupies a considerable amount of space. Recently attempts have been made to increase the payload space by locating the engine under the passenger seats and beneath the floor, either at the side or at the rear of the vehicle. In a few instances the powerplant, including engine, clutch, and variable-speed mechanism, is located beyond the driving axle and transversely of the vehicle below the rear transverse seat which extends entirely across the body.

A powerplant comprising an in-line engine, clutch and transmission, of an output sufficient for a large bus, is too long to be accommodated readily in this space underneath the rear seat, and Howard A. Flogaus of Ferndale, Mich.,

driving axles in which it is applied. By this construction it is possible to use smaller and cheaper bearings than would otherwise be practicable. The invention consists in forming the surface of the bearing shaft as a bearing surface for the rollers of the pinion back-up bearing, the pinion being formed integral with the shaft.

therefore arranges* the driving elements in a more compact manner, as shown in the illustration. Engine and clutch are mounted as a unit under the transverse rear seat, and from a pinion on the end of the clutch shaft the power is transmitted to the final drive gear midway between the rear driving wheels and in a housing which is preferably supported by the body structure, through an angularly arranged propeller shaft with universal joints and a variable speed transmission, the transmission housing being flanged to the final-drive housing. A transmission brake is located immediately back of the final-drive housing.

* Patent No. 2,037,464. Motor Vehicle Driving Mechanism. Howard A. Flogaus of Ferndale, Mich., assignor to General Motors Truck Company.

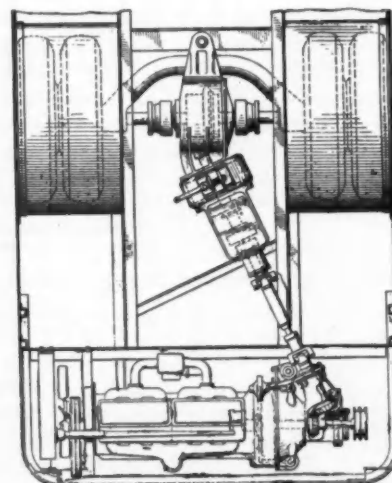
IN one system of motor-vehicle lighting a fuse is inserted in the light circuit and a relatively high resistance is connected in parallel with the fuse, so that when the fuse blows because of a short-circuit in the line, the light circuit is maintained through the high resistance and the lamps will give a dim light, which will enable the driver to drive the car to a garage. An objection to this system is that drivers frequently do not recognize that their lights are dim and continue to drive with defective lights for a considerable time.

In another system a thermostatically-controlled switch is inserted in the light circuit, which in case of a "short," alternately makes and breaks the circuit, thereby causing a flashing of the

lights and giving an unmistakable indication of trouble. However, when the action of the switch breaks the circuit, the lights are completely off and the car cannot be driven.

Lester L. Beltz of Detroit has invented a system* which while giving a readily noticeable signal, also permits of the car being driven slowly to the garage. He connects a heavy resistance in circuit with the headlamps, capable of carrying sufficient current to dimly light the lamps and of capacity sufficient to prevent fire when the circuit is "shorted." In addition he provides a thermostatic switch in parallel with the resistance, this switch periodically bridging the resistance and causing the lights to light up brightly.

* No. 2,037,058. Lester L. Beltz, Detroit, Mich., assignor to Packard Motor Car Co.



Flogaus driving mechanism

Tubular Frames Proposed

*Suggested Designs Emphasize Strength, Light Weight,
And Low Cost of Square Section Materials*

IN the belief that the light tubular framework typical of aircraft practice will spread to other types of transportation units, Steel and Tubes, Inc., Cleveland, Ohio, has been studying this form of construction and has formulated some fairly definite recommendations for automotive engineers.

Experimental work to date has convinced this organization that it is possible to build a light-weight, strong, and relatively inexpensive vehicle even in the present state of the art, and it is felt that the prime cost undoubtedly could be further reduced with the normal improvement in materials and production techniques. The tubular construction is being suggested first for bus and trailer bodies. Then as the art develops, particularly as the rapid welding processes become available, this principle should be economically applicable to the building of passenger car bodies for even the lowest priced cars.

We have illustrated here a proposed body framing for a rear-engined, frameless bus of modern construction. It is proposed to make the entire framing of square and rectangular tubing of low carbon steel.

Square and rectangular tubing is recommended because it provides a flat surface for the attachment of sheets and also because of the ease with which the tubular joints can be prepared. Much work has been done recently on the development of the "percussion" method of welding tee, butt, and acute angle joints. This is a resistance welding method employing high current with vacuum tube control of timing. It produces welds of high strength and leaves

a clean joint with practically no extruded metal for subsequent removal.

Sheets may be attached to the tubular members by the use of standard spot welders. In this method, the bottom electrode has a flat point instead of the usual trimmed point. Standard portable welding fixtures are available with

deep throats which permit reaching around sheet sections as long as 30 to 36 in. Percussion welding also may be used where it is desirable to leave the outside of the sheet free of spot weld marks.

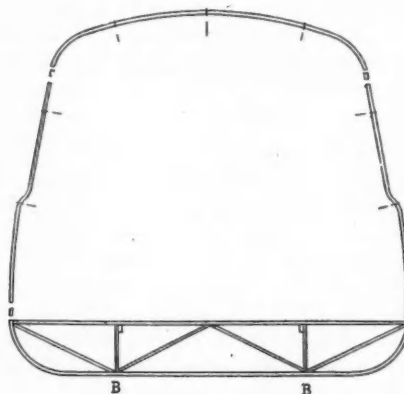
In high production, the entire frame may be set up in a master buck fitted with the percussion-welding figures and it is expected that all the joints can be welded automatically in one setting. Or the body can be made up of sub-assembly sections which may then be joined in a master buck.

The greatest advantage of the tubular construction is its flexibility. Moderate changes in body form can be made without incurring the usual high expense for tooling, dies, and fixtures since the master framing buck can be altered to suit. So far as the frame members are concerned, changes in the stops on the bending machines will accommodate any contemplated form.

The tubular bus frame illustrated here has been laid out for a 35 passenger Metropolitan type bus. It weighs 875 lb. and the resulting vehicle when compared with a modern light-weight bus now in use is calculated to show a weight saving of 1337 lb. for the complete vehicle.

Actual cost comparison, naturally is not available, but estimates indicate that this bus body could be built cheaper than by any method in use today, given the proper jigs and welding equipment.

For passenger car bodies, this construction would eliminate the costly investment in press dies and equipment required for the fabrication of frameless body structures.



Cross-section of bus frame

Cross frame members 1½ in. by 1½ in. by 18 ga.

Struts, floor braces 1½ in. by 1½ in. by 18 ga.

Secondary longitudinal members at B and by lines ⅝ in. by 1½ in. by 18 ga.



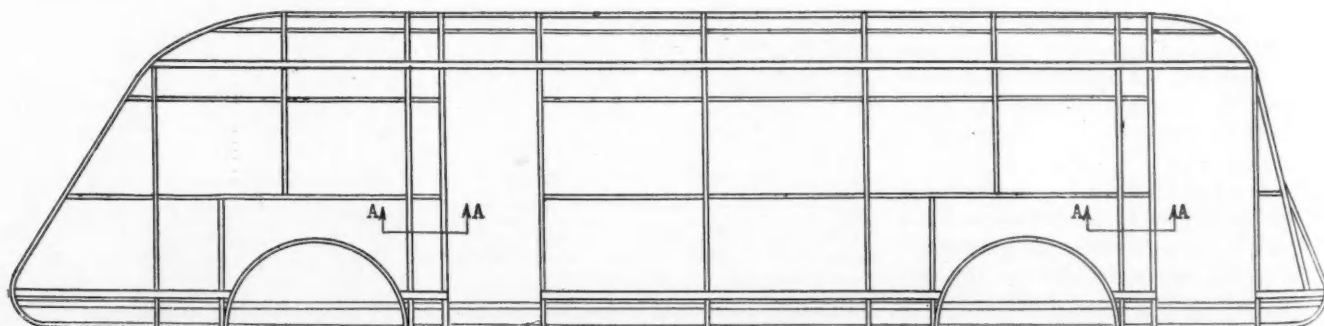
Section A-A

Refer to drawing below
18 ga. sheets spot welded to tubes

(Below) Longitudinal section

Main longitudinal members 1½ in. by 2 in. by 18 ga.

Approximate weight of frame 875 lb.



Just Among Ourselves

Rear-Engine Design Shows Possibility

ONE of the contentions advanced for automatic or semi-automatic transmissions is that the elimination of the gear shift lever will clean up the front compartment of the automobile and allow more room for passengers.

We have seen recently an interesting experimental rear-engine design which uses a conventional transmission, with the control lever mounted on the instrument panel. With the parking brake slung from under the panel this gives an obstruction-free front seating arrangement, while the rear-engine mounting allows the body to be made wider in front. Rear-engine designs don't seem much closer commercially, but the work that has been done on them continues to add to the interesting possibilities of providing answers to questions which are now being tackled from another angle.

* * *

Strikes Strike Dealers' Shops

AUTOMOBILE dealers in some sections of the country have been experiencing strikes in their repair shops. As we get the story, trouble starts usually in a shop where the mechanics are underpaid and with this as a stimulus, the minor growls of mechanics in other shops in a city are swollen to elephant size, with a resulting city-wide strike of automobile mechanics.

So far, efforts to form unions among automobile mechanics haven't been conspicuously successful, and the strike problem hasn't been serious, but it has cropped up when dealer-association managers fraternized.

It has been a matter for discussion, too, among the men con-

cerned with labor problems at the automobile factories. The suggestion has been made for a clearing-house on labor relations to be handled through the National Automobile Dealers' Association.

In some cases, dealers have solicited factory aid in the handling of strikes, but there are adequate reasons why the factories should not mix in local quarrels involving labor.

One factory, however, is said to have recommended to dealers that flat-rate payments to mechanics be abolished in favor of hourly rates, and another has suggested to its dealers that they consult with the local factory representative in case of labor troubles. Assistance in such case will probably and necessarily be limited to providing advice.

* * *

Closed Territories Or Open Warfare

IN the August issue of the *Automobile Trade Journal*, Don Blanchard (who used to write this page as editor of *AUTOMOTIVE INDUSTRIES*) discusses the pros and cons of territorial protection for automobile dealers.

"From the dealer's standpoint" according to Mr. Blanchard, "except perhaps in multiple-dealer cities, there is no doubt that closed-territory contracts, rigidly enforced, offer the most attractive way out" (from under the harassment of cross-selling, bootlegging and wild-trading competition).

In multiple-dealer cities where the latter problems are most acute, it is pointed out, "the closed territory idea runs into difficulties, even from the dealer's standpoint."

If each dealer were given exclusive sales rights in a section of the city the enforcement problem would be extremely difficult

and there is no doubt that a good deal of friction would develop not only among dealers, but also with the public, as some buyers would resent their inability to purchase from any dealer in the city.

Factories believe, if current practice may be assumed as evidence, that the open territory system is productive of the most volume. Mr. Blanchard points out that their best dealers might recognize better profit opportunities in a closed-territory plan, but emphasizes the point that dealer plans must be constructed on a realistic basis—in accord with what can be expected of the average dealer.

The argument in full is worth reading for anyone who has the slightest interest in the sales picture.

* * *

Akron Wallows In Labor Mess

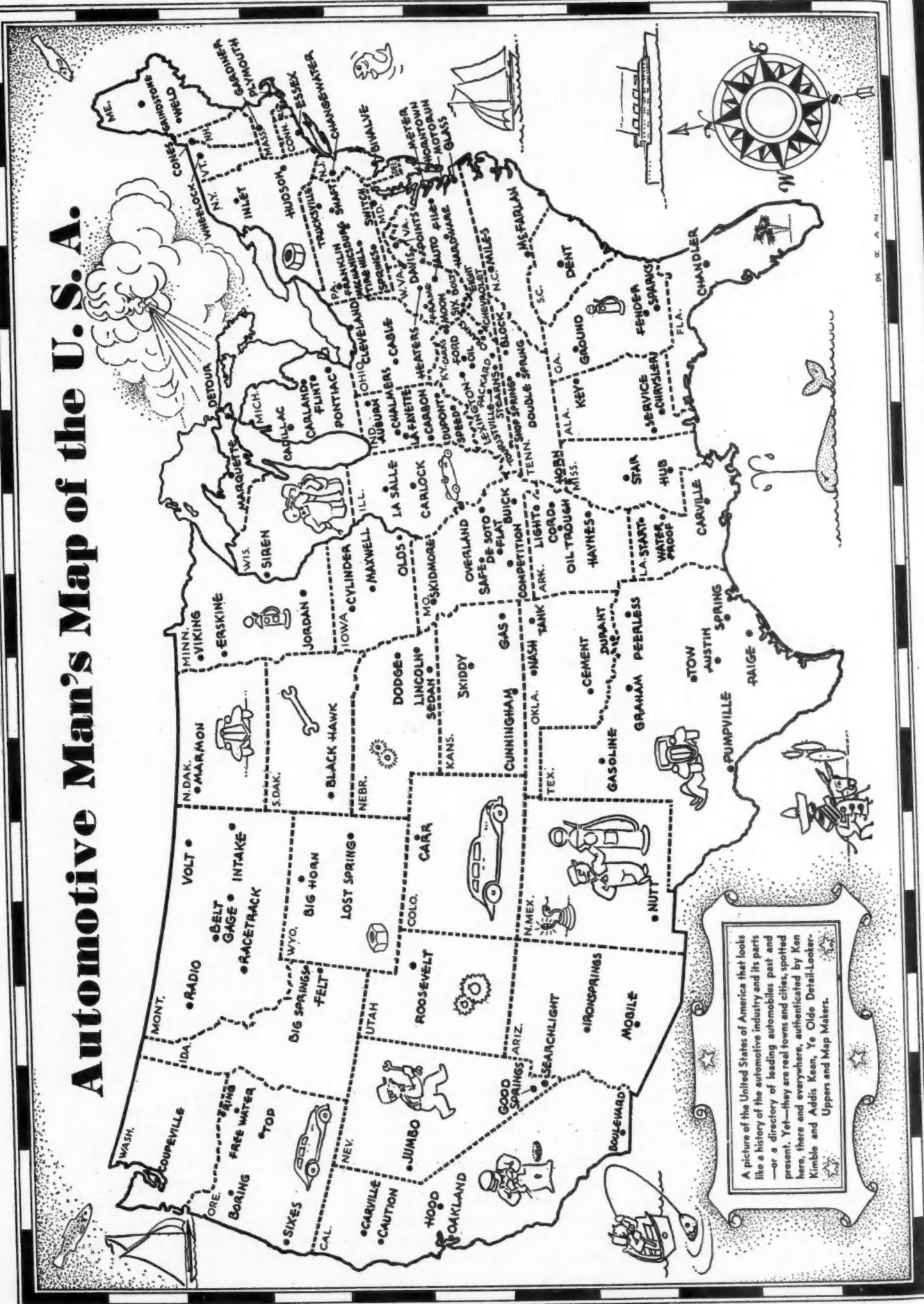
AKRON continues to supply the most disquieting news on labor questions. At the tire factories, the "sit-down" strike of ill fame has evolved into the "slow-up," under which material is allowed to proceed smoothly through all departments until it reaches inspection, where unionists dawdle in such a way as to clog the flow of material from other departments.

The United Rubber Workers, it is reported, plan to present at an Akron convention in September an uncompromising demand for a closed shop so far as the tire factories are concerned.

"No compromise" seems to be rife in the thinking of the tire manufacturers, too. Shopping for plants outside Akron continues and one plant which will close for vacations at the end of August is reported as prepared to shut down for 60 days beginning in October, or to cut personnel drastically unless the labor situation clears up.

Tire-making equipment suppliers in Akron are of the opinion that Ford is serious about plans to enter tire manufacturing. Some say that Ford's tire plant will be the finest in the world, with no expense spared to lay it out and give it the latest in scientific equipment.—H. H.

Automotive Man's Map of the U. S. A.



The Horizons of Business

—By Joseph Stagg Lawrence

Snake Oil for the Taxpayer

SOME weeks ago a complaisant Federal Reserve Board declared that huge excess bank reserves constituted a crisis in the making. This crisis was nothing less than the danger that member banks with idle reserves would so expand the nation's credit as to bring about inflation. The only element in the nation's credit structure which had expanded appreciably during the last three years has been the investment account—not the loan account. The expansion in the investment account consisted almost entirely of government bonds. This growth was reflected on the opposite side of the balance sheet in a corresponding swelling of bank deposits, an increase which had its origin in the huge deficits of the Federal government.

The offer of bonds which caused the banks' portfolios to puff was initiated by the Treasury. Still palsied with the fright of the banking holiday and the events leading up to it and subject to periodic scrutiny of three distinct and at times conflicting types of government inspection, i.e., of the Comptroller of the Currency, the Federal Reserve Board and the R.F.C., the banks were not doing any reckless lending. This is convincingly indicated by the course of commercial loans which have remained practically stationary while the government bond account and deposits mounted a steep incline.

Just To Prevent a Cold

The banks had exhibited not the faintest tendency to use their reserves. The Treasury itself was entirely responsible for all the expansion which had taken place in bank credit. The reduction in the gold content of the dollar, which independently has the same inflationary implications as the bloated government-bond portfolios of the banks, was likewise initiated by Uncle Sam. The rise in reserve requirements cannot possibly affect these two primary, probable causes of ultimate inflation. If these two causes persist we can have inflation even though reserve requirements are raised to 100 per cent of deposits. In spite of this

the Reserve Board solemnly assured the country that its action was dictated by a desire to spare America the monetary horrors of inflation.

A Pleasant Surprise

During the past week the country was treated to another little stage play the script for which was prepared by the same publicity genius who arranged the profound excess reserve ruling of the Federal Reserve Board. Mr. Morgenthau wrote the President a note which so surprised the Chief Executive, agreeably of course, that he immediately called the finance leaders of Congress, Pat Harrison of the Senate and Robert Doughton of the House. The President laid before them the happy message from the Keeper of the Purse. It seemed that the government's income was mounting, its expenditures declining, both movements developing with such gratifying speed that a balanced budget was in sight and additional taxes did not have to be levied during 1937. The heralds of the government were summoned to the White House and the glad tidings proclaimed.

A Sour Nature

Possibly it is ungracious to interrupt the momentous paeans which the literary mercenaries of the New Deal are singing. After all it is an epochal achievement and quite the height of something or other. For unless our memory betrays us it is not so long ago as history is written since the government acclaimed the virtues of spending. Did not John Maynard Keynes demonstrate down to the last mathematical summation that government spending in excess of receipts had therapeutic properties of extraordinary value. Was not this champion of public extravagance warmly welcomed at the White House and his theories used in New Deal publicity?

A Missionary For Every Pot

Perhaps these are but the impious reflections of a reactionary. In politics memory's files should never be kept for more than a week. Anyway new occa-

sions may call for new public virtues. H. L. Mencken was so coarse as to suggest that if the public developed a penchant for cannibalism the White House would start to fatten missionaries on the front lawn "come next Wednesday." The trouble with Mencken is that he fails to recognize real Democracy when he sees it. If the bulk of the voters develop a taste for missionaries should not a representative government, truly reflecting the public will, set an example and include in the specifications of the "more abundant life" a missionary for every pot?

A Plague of Economic Royalists

The delicate antennae at the capitol have picked a disturbing note out of the political atmosphere. There are many more people in this country who have property than there are people who do not. There are 65,000,000 deposit accounts, about 47,000,000 life insurance policies and about 27,000,000 homes the great bulk of which are owned by the people who live in them. Each one of these is an "economic royalist" in his own right.

It seems, therefore, that the woods are full of these loathsome creatures and unless their fears are calmed they might rise and kick the party in power unceremoniously out of power. This would interfere with a great many carefully laid plans to improve the lot of mankind. These "haves" have been unduly alarmed by people with vulgar political ambitions who are now seeking office. They have acquired a paleolithic notion that the citizens not on relief, who work for a living and have more than ten dollars, may some time be forced to pay the cost of the New Deal, that this necessity may in fact become so acute as to require new taxes in the near future. Mr. Morgenthau has discovered that such taxes will not be necessary and that the Federal Government is rapidly approaching a stage where the budget will be balanced.

Some Facts

What are the facts? From July 1, to Aug. 11 the total receipts of the government were \$482 million as compared to \$439 million in the same period last year. Ordinary expenditures

(Turn to page 256, please)

The Forum

"Thirty Miles Per Gallon"

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Heldt's article, "30 Miles per Gallon," in the April 25 issue of *AUTOMOTIVE INDUSTRIES*, describes the ideal car that I have often thought could be made, but have never heard anyone else talk about.

I have worked out consumption curves from the data for the three gear ratios and feel that a lot more could be said for the car than was said in the article. In the first place, it would be the only really quiet car at speeds of 40 and over, because the engine would run slowly and would not roar, as many cars do at present. Secondly, the engine would wear and last much longer due to lower speeds on the cylinder and piston, and the forces on the connecting-rod bearings would be lower.

The oil consumption would be very low and would stay low for many thousands of miles. The whole car would stay tight and not rattle as soon, because of the lower speed of the engine.

I believe the ideal engine for this car is a flat four similar to the "Midshipman" marine engine. This engine could be set low and the people moved forward so as to give a really roomy car

with good visibility, and yet keep it small and light.

I have had another thought which I think would improve automobiles, and that is duralumin rims, felloe bands or pressed wheels. These parts are quite heavy and the weight is all un-

sprung. I believe that duralumin could be substituted for steel in the same thickness, and worked with the same tools. The saving in weight would make better riding, longer tire life and higher acceleration.

A direct third and a geared overdrive is the right idea, because the third is used in cities and parks at 30 m.p.h., where the car is quiet, but the fourth is used at 60 to 70, when the wind makes so much noise that it is difficult to hear the gears. I have always said that what we need is the present three gears with same ratios and direct drive in third plus a geared overdrive.

ELLIOT DALAND.

Radical Design in 1925

Editor, AUTOMOTIVE INDUSTRIES:

Your readers who have referred to early radical designs seem to have overlooked an American one which was built in 1925. I have an August, 1925, issue of *Motor* which has photographs and a description of it. I will quote the exact words of the editor:

"A number of radical features are noted in the new Julian six, built by the Julian Brown Development Corp., Syracuse, N. Y. The engine is placed under the rear deck, having six stationary radial air-cooled cylinders. Clutch, transmission and differential are located underneath, with rear wheels driven through axle shafts pro-

vided with universal joints. The frame consists of a tube 4½ in. in diameter with a cross tube at either end on which the body is mounted. The front transverse spring is shackled at only one end, and the ends of the rear transverse spring are mounted in Celeron blocks. Quarter-segment expanding rear wheel brakes are used, two opposite segments in each drum, being connected respectively to pedal and hand lever.

"Advantages due to placing the engine in the rear are numerous, and while the matter has been up for discussion for some time, it is interesting to note that this is the first rear engine car to be placed on the American market in nearly 20 years. Heat generated by the engine does not cause discomfort to the passengers, and engine noise, small though this may be, is rendered negligible with the rear location. With two-thirds the weight on the rear wheels, the need for four-wheel brakes is practically eliminated. Other advantages urged for this particular car are: Easier riding due to reduced unsprung weight, elimination of body weave and squeaks due to tubular frame, less pitching and swaying due to lower center of gravity, elimination of torsional vibration due to short crankshaft, ability to turn in a circle slightly more than 30 ft. diameter.

"The car equipped with five-passenger closed body weighs 2400 lb. and will be priced at about \$2,500. The wheelbase is 125 in. The engine has a

A Growing Hazard

Editor, AUTOMOTIVE INDUSTRIES:

Many drivers have no doubt noticed the increasing tendency of modern cars when traveling in wet weather to pick up large quantities of water and dash it against the windshield of oncoming cars. The effect is startling, to say the least, and may momentarily entirely obscure vision from the car traveling in the opposite direction. The amount of water which can be picked up and thrown into the air from the surface of a perfectly smooth and properly

crowned concrete road during a heavy rain is amazing.

This is a subject which warrants further investigation. A determination of the extent to which tire design and body structure contribute to this effect would perhaps make it possible to determine whether the phenomenon is inherent in modern design trends or can be controlled by minor modifications. It will no doubt become of greater importance the more roads are improved and car speeds increased. J. J. CROOKSTON.

bore of 3% in., a stroke of 5 in., a compression ratio of 4.8, and is rated at 60 hp. The valves are horizontal and open into a pocket at the end of the cylinder head, being actuated by rocker arms. The crankshaft has two throws, with three connecting rods on each throw. The transmission is a combination two-speed planetary and sliding gear which gives four speeds forward

and two reverse. Depressing the clutch pedal engages the planetary gearing located within the flywheel."

The center of gravity on this car seemed to be considerably lower than on the North-Lucas.

Very truly yours,
H. F. GIEBLER.

4065 N. Vancouver Ave., Portland, Ore.

Accurate Accuracy

Editor, AUTOMOTIVE INDUSTRIES:

There always has been a considerable difference of opinion as to just how close certain operations can be held "commercially," and by that I mean by the ordinary or regularly established production methods.

One reason for this difference of opinion is the pretty well-known fact that many parts go into the assembly of an automobile that are not within the dimension tolerances specified on the drawings, and as long as the rejections do not reach too high a percentage, we naturally assume that the tolerances are being held.

The engineering department, not being notified of any difficulty in holding to past tolerances, continues to specify according to past practice.

It would be beneficial to both the production department and the engineering department if we could establish "commercial" tolerances which could be held by standard production operations, with the view that if closer tolerances are required, special consideration must be given to processing same.

A good way of finding out what we can do would be to check what is being done every day on the different operations. This information should be tabulated and studied; if thought advisable, changes should be made on equipment and tooling, tests re-run, and, finally, the tolerances established.

What the engineering department would like to know is how close can the production department hold the following operations without many additional operations, trick expensive tooling, high perishable tools cost, high percentage of inspection or rejections:

1. Diameter of reamed holes in steel.
2. Diameter of reamed holes in iron.
3. Center distance of drilled and reamed holes in steel.
4. Center distance of drilled and reamed holes in iron.
5. Center distance of drilled and tapped holes in steel.
6. Center distance of drilled and tapped holes in iron.
7. Diameter of turned or shaved work from screw machine.

8. Diameter of centerless ground pins.
9. Diameter of round work ground on centers.
10. Diameter of ground holes.
11. Center distance of punched holes in stampings.
12. Diameter of pierced holes in stampings.
13. Shaved surfaces on stampings.

This list is only a suggestion and can be revised to suit conditions.

FRED W. CEDERLEAF.

Production of Large Forged Crankshafts

Editor, AUTOMOTIVE INDUSTRIES:

Permit me to make a correction regarding your comments on my paper on cast crankshafts, as printed in your May 16 issue, page 707. You say that the fact that 2000 lb. of stock is removed by machining a forged crankshaft indicates that it is turned up from a solid slab.

A forged crankshaft of the size in question, that is, a shaft too large to be die-forged, is made as follows: The billet is heated to a temperature of 2150-2200 deg. F. and forged with all cranks in one block or slab toward one

An Answer to: What Is Cast Iron?

A definition of cast iron, of possible use in legal actions, was discussed at a recent meeting of the Metallurgical Advisory Committee of the National Bureau of Standards. A previous tentative definition was modified somewhat to read as follows:

"Cast iron is a cast alloy of iron and carbon, with or without other elements, in which the carbon content exceeds the maximum limit of solid solubility, as determined at any temperature (which in plain cast iron is 1.7 per cent) and hence contains eutectic carbide or graphite as a structural feature. It is not usefully forgeable at any temperature."

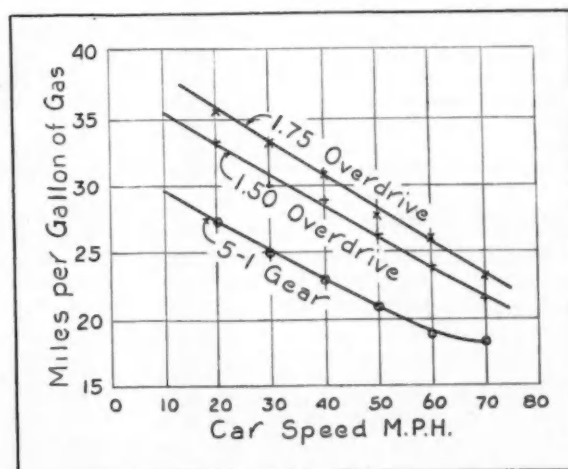
We wonder whether the last sentence could not properly be made to read: "It cannot be forged at any temperature." The way it reads now the definition seems to make a distinction between useful and useless forgeability, which distinction is by no means clear.

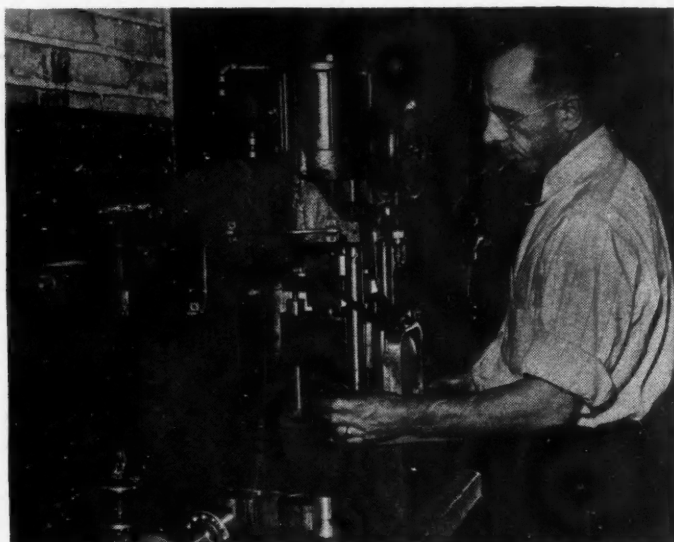
side. Blocks are then cut out at the main-bearing journals, and the journals are machined oversize but smooth. The shaft is now heated to 2100 deg. and twisted for the proper firing order.

After twisting, blocks are cut out at the crankpins. The shaft is now ready for rough machining, which is followed by heat treatment and finish machining. The above explanation is believed to give a clearer picture of the reason for removing the great amount of stock from a forged crankshaft, which in reality is not a solid slab.

ANKER K. ANTONSEN.

Weight, 2700 lb.;
frontal area, 25 sq. ft.;
displacement, 120 cu.
in.; engine speed,
4000 r.p.m.; hp., 56;
normal gear ratio, 5:1;
overdrives, 1.5 and
1.75:1; specific consumption,
0.53 lb. per hp-hr. = 0.087 gal. per hp-hr.





This electric and hydraulic gage checks Pontiac engine and connecting-rod bearings for diameter and load

Production Lines

On Universals

Another treat in store for the engineer this year will be the variety of developments in propeller shaft drives. There is the Mechanics slip-joint of novel construction; a new rubber-insulated universal with great promise; and a special drive that's indeed novel. But we can't say anything about it for a little while.

Some Ingredients

GMC is happily working on an order for 200 new double-deck buses that have impressed us beyond words. Just in a spirit of clean fun they have run off an estimate of some of the raw materials that eventually will form the warp and woof of these transportation units. Here is a brief list for all to ponder—

- 14,400 seats
- 17,600 lights
- 501,400 ft. wiring
- 600,000 lb. steel
- 913,500 aluminum rivets
- 198,800 lb. tire rubber
- 172,800 lb. rubber for cellular seat cushions
- 93,600 lb. chrome steel seat frames
- 69,400 sq. ft. glass
- 21,600 yd. upholstery fabric
- 1,400,000 lb. aluminum sheet and alloy structural members

Cutting Fluids

Those concerned with cutting fluids will prick up their ears when they hear the glad tidings that quite a few producers are winding up some important test work on their new products. For many years, the shop equipment has been the only reliable proving ground for these materials but from now on you may be able to get definite recom-

mendations that can be proved immediately and without long experiment in your shop.

Ring 'Em In

The 1937 car announcement season has burst on us like a summer storm. One line will be shown to the public on September 15. And we have reason to believe that at least one or two more lines will come through before the month of September is out. We have an idea that there will be lots of new things in which you will be interested. And we'll pick 'em for you.

Remote Shifting

A large group of cars for 1937 are expected to feature the Bendix electric hand. The development of remote shifting should be heightened as the year wears on due to the entry of the Evans Auto-Shift, on which we reported recently. Close on the heels of this announcement we heard from another organization specializing in vacuum devices. They, too, will have a shifter operated by vacuum. But it will feature a unique means of providing automatic advance through the gears without moving a finger, once the car is started from first.

Rear Engine

By the looks of things, GMC buses are definitely trending to the rear location for the power plant. This company also is working on its first large order of diesel-electric buses using a big Hercules diesel. They find more flexibility, better acceleration and, of course, better economy. This is the biggest boost for the automotive diesel

to date and it should presage great things for diesel power in heavy transportation.

Hypoid Axles

We didn't realize some months ago just how great the landslide would be toward the hypoid rear end. It's almost certain that there will be more with than without and that goes for some of the largest producers. By the by, Elco has a right fine E-P lube for hypoids, according to a very good source—not the Elco salesman.

Saves Money

Oakite News Service reports an interesting case where the use of Oakite cut the cost of laundering rags and towels some 30c. per load of 100 pounds. The principal elements of saving came from a reduction in the amount of cleaner, also in the reduction of the number of rinses and time per rinse.

Swing Along

According to AMA figures the number of auto radio sets in use in 1935 was 3,000,000. Of this number, 1,100,000 sets were purchased in 1935. With the ever growing popularity of auto radio and the dispelling of early prejudices 1936 figures should be correspondingly larger. Auto radio is a big field and well worth the effort expended toward improved reception. The next important step is the development of a more satisfactory form of antenna, what with the universal swing to all-steel, turret top bodies.—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

AUTOMOTIVE ABSTRACTS

(Continued from page 241)

In buses also it is possible to so conduct the cooling air through the vehicle that no great loss takes place and this without interfering with efficient cooling of the engine.

Among the conclusions drawn from the tests are the following: Measurement of the air resistance with the model parallel to the direction of flow is not sufficient, since the sensitivity to side winds varies greatly with different models. For instance, models without tapering rear end may show up quite favorably in the central position but have much more resistance in a side wind. A simple, smooth form of the front is of considerable importance, as is also a smooth, closed under surface and careful guidance of the cooling air. There is a remarkable difference between the air resistances of a smooth body alone and of this body with wheels, open wheel housings, passages for cooling air, etc. In the case of heavy buses the lateral forces due to side winds are of little, the lifting forces of no importance. —ATZ, March 25.

* * * *

Infra-Red Radiations from Otto-Cycle Engine

A RESEARCH on the radiation from engine explosions was carried out at the National Bureau of Standards. The author of the article under review participated in this research work, and he made an analysis of the results and formed certain personal opinions regarding the matter after leaving the Bureau. No significant changes in the spectral distribution of either radiation intensity or total radiant energy throughout the explosion stroke were detected in the case of average engine explosions. Records of the radiations were made through two fluorite windows, one close to the spark plug and the other directly above the knocking zone. Through the window above the knocking zone a greater proportion of long-wave radiation (5–11 μ) was recorded for a knocking than for a normal explosion. During a restricted period of time more energy is received (through the window above the knocking zone) from a knocking than from a normal explosion, but the total received throughout an average explosion-expansion stroke is greater for normal than for knocking combustion. The author discusses the results in detail, with the aid of numerous diagrams, and also gives an outline of future research work on infra-red radiation from explosions in the cylinders of internal combustion engines.—*Engineering*, March 20.

* * * *

Motor Freight Cost In Germany

A N estimate of the cost of motor freight haulage in Germany, based on an annual mileage of 25,000 and an average of 50 per cent pay load, and a comparison of the figures arrived at with current railroad freight rates led to the following conclusions: A 1-ton truck equipped with gasoline engine can compete only up to 15 miles, on the basis of the general freight rates, but up to 60 miles on the basis of express freight rates. A 3-ton Diesel truck can compete up to 185 miles at ordinary freight rates and up to well over 300 miles at express freight rates; the 6-ton Diesel truck can compete at the ordinary freight rates up to 250 miles and at the express freight rates over any distance over which freight can be carried in Germany. Even a slight increase in the annual mileage of the trucks would render them competitive over considerably longer distances.

The above comparison is intended to apply to private shippers. Public trucking corporations are said to operate under considerably more favorable conditions, since return freight bureaus enable them to increase the average payload, and such concerns are large users of tractor-trailer trains which can be operated more economically than single trucks. The operation of the return-loads bureaus is said to have proved very beneficial to the truckers. For instance, from the last half of 1934 to the first half of 1935 there was an increase of 5 per cent in the number of tractor-trailer trains handled, while the amount of freight handled increased 13 per cent. The largest increase (16 per cent) was in bulk goods, while piece goods increased only 8 per cent.

The above comparison is based on current freight rates in Germany, and in this connection it is pointed out that all freight rates, both road and rail, are under the control of the German Transport Organization and that no changes in rates will be considered unless they can be shown to be to the advantage of the nation as a whole.—*Bull. Hamburg World Economic Archives*, Oct. 15.

* * * *

Ball Bearings on Machine Tools

IN automobile and similar applications, some slight movement of the axis of anti-friction bearings is not objectionable, but in certain machine tool applications the axis of the part supported by the bearings must be absolutely fixed. Therefore, when ball and roller bearings were to be applied to machine tools a new problem presented itself. The solution of the problem lay in a new technique, originating, it is believed, in the United States some six years ago, and known as pre-loading. This term indicates that the races of one or more bearings are mounted in such a manner that on first assembly all the inherent slackness between balls and races is taken up, and by subsequent adjustment the bearings are put under an initial stress which may be as high as several hundred pounds. This loading is independent of the working load of the machine.

Pre-loading bearing practice falls into three main groups. In the first the bearings, usually of the angular-contact type and two in number, are mounted comparatively close together and have their races adjusted relatively to one another by a threaded cap or cover. As one race is made with a surface analogous to a taper, this longitudinal adjustment sets up a wedging action and gives a permanent load of the desired degree.

In the second constructional group the bearings are loaded by springs applied in several ways, the strength of the spring being calculated to provide the desired pre-load. The third method of construction includes bearings assembled in a housing by the bearing maker and, in general, involves the use of inner and outer races of different thicknesses, the inner of the two, when subjected to a predetermined pressure, becoming deformed to the extent necessary to give the degree of pre-loading required.—*Engineering*.

We have been informed that the composition of Pyroil, an addition agent for lubricating oil which is claimed to have particularly beneficial effects where the oils are used in cadmium-silver and copper-lead bearings, has been materially improved recently. Pyroil is the product of The Pyroil Company, LaCrosse, Wis. The company submits test results obtained by C. A. Crowley, director of research of Technical Service Bureau, Inc., according to which the wear was always less with Pyroil, the bearing temperature was reduced, corrosion of the bearings was inhibited, and the friction torque was cut down.

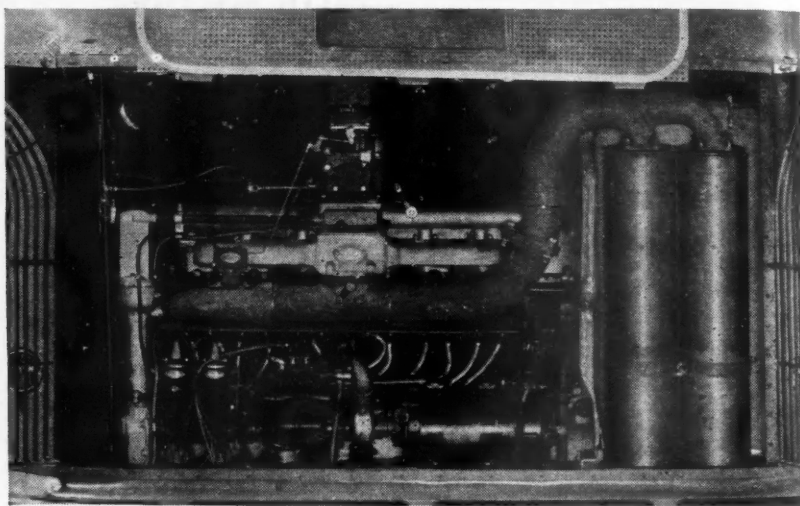
G.M. Buses with Rear Engines, Angular Drive

(Continued from page 245)

of the driver's compartment. A communicating system enables the driver to call stops.

The double-decker is powered by the Model 707 engine mounted crosswise at the rear. Drive is through an automatic "Banker-type," self-shifting transmission which is noiseless and designed to free the operator of all gear changing operations.

GMC is also going into production on the first large order of Diesel-electric buses of which twenty-seven 36-passenger units will be built for Public Service Coordinated Transport of Newark, N. J. The power plant is a Hercules diesel of 529 cu. in. displacement, developing 150 hp. at 2200 r.p.m. It is mounted transversely at the rear, direct-connected to a General Electric generator. The special G.E. propul-



(Above) The Supercoach engine with overhead valves, 5 in. bore by 6 in. stroke and 707 cu. in. displacement. It is rated 185 hp. at 2300 r.p.m.



sion motor is mounted ahead of the single bowl, spiral bevel gear axle and drives through a universal joint.

It is claimed that the combination of the diesel engine and electric drive provides a very flexible power plant; producing also excellent acceleration. Power may be utilized either as high torque at low vehicle speeds or low torque at high speeds with many variations in between. Experimental tests on the first bus of this type have demonstrated that the Diesel-electric drive gives appreciable fuel economy.

(Left) The new 75-passenger GMC double-deck bus

French Dealers Hope To Control Trade-Ins

IN France the National Automobile Manufacturers Association and the National Automobile Dealers Association are reported to have reached an understanding which is expected to do away with excessive trade-in allowances and other abuses with which the automobile trade of France has had to contend. The two organizations mentioned sent the following statement to the press in this connection:

"The public has not become sufficiently cognizant of the fact that the French automobile industry has never ceased to reduce its prices. In comparison with pre-war prices—as far as comparable cars are concerned—the present prices are infinitely lower than those of other national products.

"In spite of new taxes imposed upon

them the automobile manufacturers plan to continue this policy. What they desire above all is the further popularization of the automobile, the principal stimulant of economic activity in the country.

"Up to now they have been able to maintain their prices thanks to the co-operation of their dealers, who have accepted a material reduction in the discount rate, it being understood that: "Catalogue prices will be strictly adhered to and used cars will be taken in trade only at prices corresponding to their real values.

"This will put a stop to practices which on the whole gave the buyer a fictitious advantage, as losses sustained in one deal had to be made up on others, and the buying public will be in position to secure at reasonable prices—which will remain quite low, moreover—the vehicles of which it is in need."

Horizons of Business

(Continued from page 251)

in the same period were \$494 million as compared to \$492 million in 1935. The aggregate of expenditures for F.E.R.A., C.C.C., P.W.A., W.P.A. and Dr. Tugwell's Resettlement Administration this year was \$308 million as compared to \$196.7 million last year.

These figures do not seem to justify a public proclamation of thanksgiving. They are not the figures which caused the President to summon Messrs. Harrison and Doughton. Mr. Morgenthau charges against the extraordinary budget all the loans which the R.F.C. and the Commodity Credit Corporation made last year and credits the same budget with all the repayments on account of these loans which are made this year. It is just this slight change in the treatment of the figures which places the finances of the government in such a happy light.

New DEVELOPMENTS

Automotive Parts, Accessories
and Production Tools

Portable Press

Single Stroke Forms Shackle Pin and Bushing Assemblies

Illustrated is a portable press designed by Hanna Engineering Works, Chicago, Ill., to press shackle pin and bushing assemblies with one stroke. The power unit consists of a piston and cylinder assembly direct acting on the live die. The valve operates easily, permitting operation by either thumb or fingers. After completing the power

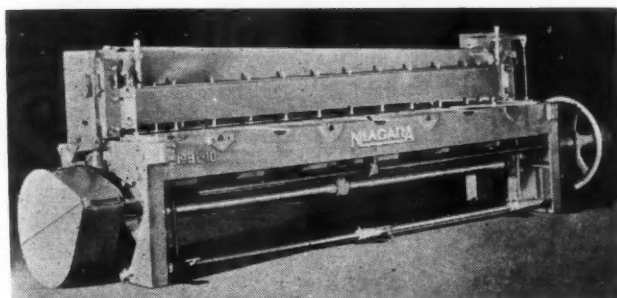
running direct from the eccentrics to the crosshead and thus relieving the housings of tension stresses. Heavy webbed beds are keyed and bolted to housings to assure and maintain positive alignment. Rear web of bed covers cross shaft thus protecting operator when removing sheared pieces at rear.

Sheets can be accurately cut to a line because the cutting line is clearly visible from the front of the shear between the pressure feet as well as from a position vertically above the cutting



Hanna portable press

sheets. Pressure feet are adjustable so that they are not dependent on striking the bed to limit their travel when the shear is operating idly. Cam and toggle mechanism accelerates the holddown rapidly until it approaches the work, when it slows down, making a firm but soft engagement without severe impact. Cam and lever holddown mechanism eliminates transmission of stress to cams, mainshaft or other moving parts during the cutting cycle.



Niagara shears

stroke, the operator releases the valve trigger which automatically reverses the mechanism. Cushioning is provided for the last portion of the piston travel. The design of the dies is said to be such as to assure correct alignment of the pin and bushing assembly into the spring hanger and avoids the necessity of the operator first "starting" the pin and bushing assembly by hand.

By using aluminum, the weight of the complete press is reduced to 125 lb., making it possible to suspend it from a balancer over the chassis frame conveyor line.

Power Shears

Niagara Machine And Tool Works Announces Line

Niagara Machine and Tool Works, Buffalo, N. Y., announces a new line of series "BL" Power Squaring Shears with capacities of 10-12 gage, built in 8, 10 and 12 ft. cutting lengths. These shears are of underdrive design. Crosshead is operated by connecting rods

edge as observed through an adequate opening between the holddown and the rearwardly sloping front web of the crosshead.

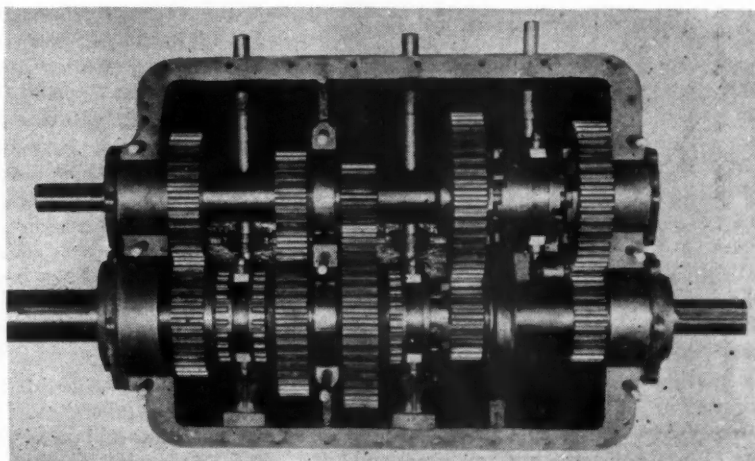
Patented Niagara Holddown with individual spring pressure feet provides a firm grip on short as well as long

Two Transmissions

Cotta Models Have Chrome-Nickel Steel Gears and Shafts

COTTA TRANSMISSION CORP., Rockford, Ill., has added two models to its line of heavy-duty transmissions which now cover the range of 100-1500 lb.-ft. torque capacity. The two new units are rated at 500-1000 lb.-ft. and embody all of the special construction features that have been developed by Cotta during the past quarter century. Gears and shafts are of chrome-nickel steel, heat-treated. The gears are mounted on roller bearings, the shafts on ball bearings. Gears remain in mesh constantly, which is claimed to permit of quick, easy gear changes without undue strain on the engine.

As with all Cotta transmissions, the two new units can be practically "cus-



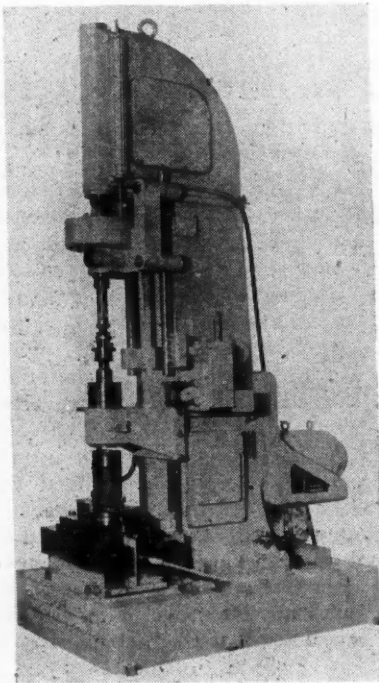
Cotta constant-mesh heavy-duty transmission of 500-1,000 lb.-ft. torque capacity

tom-built" to meet the requirements of a particular job. They can be designed for "on engine" or "amidships" mounting, for operation in the same direction of rotation as the engine or for the opposite direction, for various gear ratios, for straight or angular take-off, and for from one speed forward and reverse or two forward speeds to four forward speeds and reverse or five forward speeds.

Honing Machine

*Has Fluid Motor Speeds
With Wide Range*

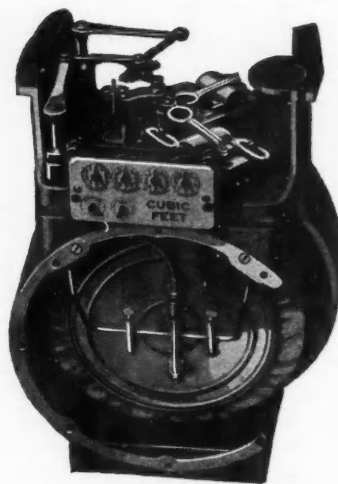
A new honing machine with fluid motor speeds providing an infinite number of steps within a given range has been placed on the market by the Barnes Drill Co., Rockford, Ill. The il-



Barnes honing machine

lustration shows the machine set up for honing automotive diesel liners. It has a range of cylinder bores from 3 to 10 in. in diameter, and a normal spindle travel of 20 in., although this can be made 40 in. or even longer if desired.

Vertical multi-splined driveshaft transmits power and variable speeds to short spindle through two (or three) helical gears in traveling spindle carriage. No sliding head is used, but rather a traveling anti-friction bearing spindle carriage, the ball bearings running directly on hardened and ground vertical shafts serving as a permanent track. Bearings are so



Oxygen meter

mounted as to hold contact to shafts and secure the traveling carriage. Take-up is provided for all angular contact bearings.

Controls for both the spindle fluid speeds and the rate of reciprocations are conveniently arranged. Hydraulic cylinder is concealed in the superstructure and its piston rod is directly connected to the reciprocating carriage. One 15-hp. motor, speed 1200, operates the whole machine. Separate small motor is used for coolant pump. Push button station is conveniently mounted. Net weight with motor—7050 lb. Floor space—47 x 75 in.

Bakelite Resin

*New Development for Use
in Cellulose Ester Lacquers*

Bakelite Corp., New York, has recently announced a new type of Bakelite resin which has been developed especially for use in cellulose ester lacquers of the modern high gloss, high solid content type. At present two modifications are available, XR-3180 and XR-4357. These new resins are the result of systematic research, extending over several years, in which the primary object has been to overcome to the greatest practical degree the recognized defects of lacquers previously available for certain exacting requirements. Chief among these has been the difficulty of obtaining a smooth, high gloss surface without the necessity of incurring additional expense for rubbing and polishing operations.

XR-3180 and XR-4357, in combination with nitrocellulose, yield lacquers of exceptional flow and gloss, their high refractive index and excellent pigment wetting producing a most attractive depth and lustre.

Special Purpose Meter

*American Motor Co. Device
Measures Oxygen Flow*

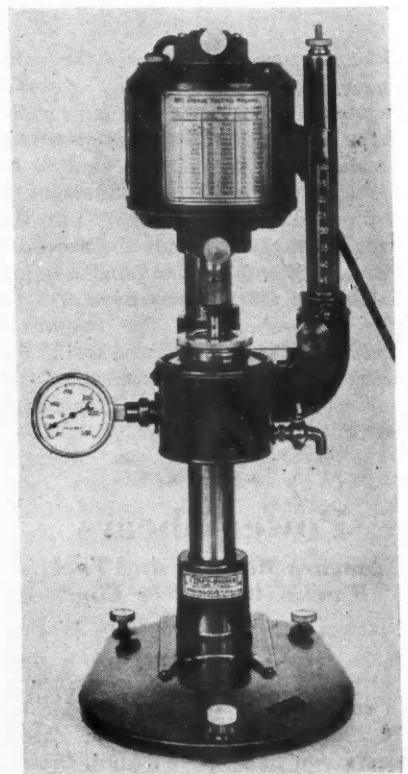
The American Meter Co., 60 East 42nd Street, New York, N. Y., has announced a new oxygen metering device said to be the first instrument of its kind designed expressly for this service. The meter will measure all oxygen passing through the line from the minimum rate of flow to the maximum capacity of the meter. It can be furnished for either low-pressure or high-pressure service,

Grease Unit

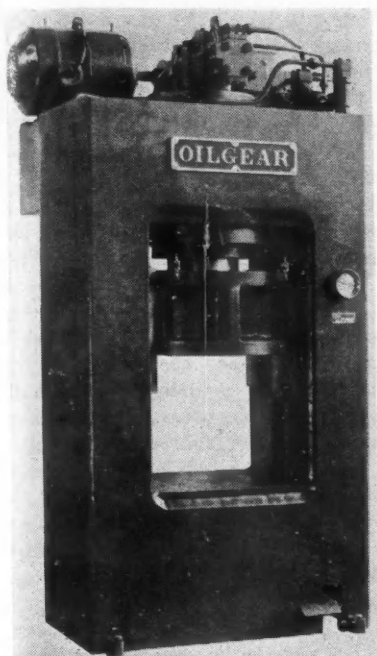
*Machine by Taft-Pierce
Tests Stability*

A new machine for testing stability of greases designed and developed by the Bearing Engineers' Committee, is offered to manufacturers and extensive users of greases and bearings by the Taft-Pierce Mfg. Co., Woonsocket, R. I.

The machine works a definite amount of grease in a moderate sized bearing running at medium speed, at various test temperatures. While it does not indicate the lubricating value of the grease, it does give definite information on starting and running torque, oil separation, change in structure and



Taft-Pierce grease tester



Oilgear 300-ton press

consistency, channeling, leakage past bearing seals, aeration and the consequent increase in grease volume.

The unit is equipped with a constant-speed, 3450-r.p.m. motor, on the spindle-extension of which is mounted a plate-shielded, size 204 S.A.E. bearing. The bearing is mounted in a grease cup which is free to turn, the grease being brought to a predetermined temperature recorded by a dial thermometer.

Speed Press

Oilgear Develops 300-Ton Machine With Enclosed Mechanism

The Oilgear Co., Milwaukee, Wis., has placed on the market a compact 300-ton speed press with fully enclosed mechanism. The main press structure consisting of the base, side frames, yoke and oil reservoir, is uniformly welded into one compact piece. The crosshead is also of welded steel construction and accurately guided in the press frame.

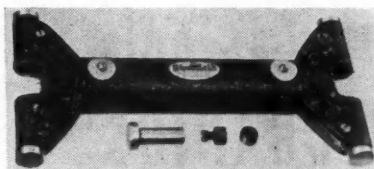
Built into the press yoke is a large bottle type double acting cylinder with ram bolted to crosshead. Two double acting rapid traverse cylinders, one attached on each side of the crosshead, are concealed in the press frame. Free flow of oil to and from the large cylinder during the rapid traverse cycle is afforded through a large automatic surge valve flanged to top of main cylinder.

Pressing the foot pedal causes the crosshead to approach the work rapidly and then automatically slow down to the pressing speed when work is

reached. Ram continues downward until maximum tonnage or positive stops are reached and will maintain full tonnage on work until operator releases foot pedal. Then crosshead travels upward at rapid traverse speed and stops automatically. A hand lever on side of press can be used to lock control in pressing position so that full tonnage can be exerted continuously without operator holding his foot on pedal. When maximum pressure is exerted the automatic unloading control reduces the pump stroke to a point just sufficient to maintain maximum pressure in the system. All control mechanism is concealed in the press frame.

Fluid power operation is provided by an oilgear pump direct connected to a 20 hp. 1140 r.p.m. electric motor, both of which are mounted on the oil reservoir welded to the top and back of frame. The automatic unloading control is adjustable so the maximum press tonnage can be varied from 60 to 300 tons. Pressing and return speeds can also be varied to suit.

Stroke adjustable—8 in. Floor space required—60 x 58 in. Net weight—20,500 lb.



Sheffield adjustable plug gage

Plug Gages

Sheffield Adjustable Instruments Give Complete Size Coverage

Sheffield Gage Corp., Dayton, Ohio, announces a line of adjustable plug gages made in two types to provide complete coverage in sizes. Twenty-three different standard sizes provide a complete range, covering a minimum of 2½ in. to a maximum of 12½ in. as well as special to meet infrequent applications.

These gages are convenient in size and possess a fine crackle finish. The frame is of a specially heat treated and seasoned alloy iron. The diameter of each gage may be quickly adjusted within its complete range. The lock is positive and utilizes a flat on a lock bushing, which by screw adjustment binds against a straight flat on the anvil.

The adjustable plug gage has a wide variety of uses; checking all kinds of holes for diameter, out of round, and taper, as well as checking the widths

of slots, etc., by the use of flat anvils. It has the additional advantage, as has the Sheffield adjustable snap gage, that it can be continually readjusted to take up wear.

Face Mill Cutter

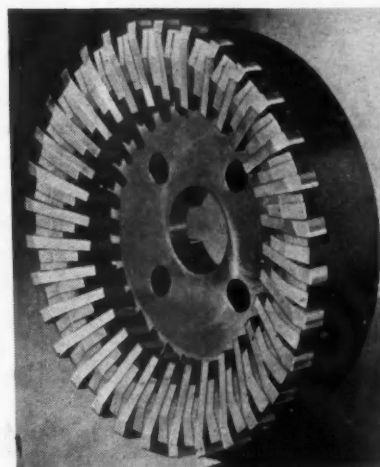
Ingersoll Supplies Machine for High Production

Recognizing an essential difference between the maintenance of roughing and finishing face milling cutters used in high production operations, the Ingersoll Milling Machine Company, Rockford, Ill., has developed the Ray-Blade Cutter. When roughing, the wear on the cutter blade is mostly on the diameter of the cutter; when finishing, the wear is mostly on the face of the cutter.

The Ingersoll Ray-Blade is a universal face milling cutter blade. It is made to lay along the radial face of roughing cutters or along the conical diameter of finishing cutters. It is radially adjusted to compensate for the diametrical wear in roughing cutters and axially adjusted in finishing cutters to take care of the wear on the face of the blade. It is easily reset or renewed any amount.

The standard Ray-Blade roughing cutter is designed for light or medium cuts ¼ in. deep or less. The radially adjusted blade is said to give twice as much wear as corresponding cone type of cutter. Finishing cutters are with closely spaced blades for fine finishing operations. They are set on the conical periphery of the cutter housing for most efficient use for finishing. For general purpose work (roughing and finishing combined), the roughing type cutter is recommended.

Additional new developments on following page



Ingersoll Ray-Blade Cutter

Tire Inflator

Altherm Develops Device to Keep Air At Optimum

A device designed to automatically keep the tires of a car inflated has been developed by the firm of Altherm Products, Inc., Brooklyn, N. Y., and is being marketed by it under the name of Evans Hub-Cap Inflator. It is mounted inside the hub cap, so as not to disturb the balance of the wheel, and consists of an automatic two-cylinder pump with both cylinders in one housing which is attached to the hub cap. Con-

nection to the tire valve is made through a tube. There is a separate valve stem on the pump housing for inflating the tire from an outside source. Power for operating the pump is obtained from the kinetic energy of the car. As the tire strikes a bump, its deflection at the point of ground contact increases somewhat, and the pressure within the tire rises. The operation of the pump appears to be as follows:

Suppose that the normal tire pressure is 25 lb. per sq. in. and that the device is set to start pumping at 23 lb. per sq. in. At the former pressure the

pistons will be all the way down in the cylinders and the return spring will be fully compressed. As the deflection of the tire decreases after having passed the obstruction, the pressure in the tire and in the low-pressure cylinder decreases and the spring forces both pistons up. This causes air to be drawn into the high-pressure cylinder through the valve at the bottom. When the next bump is hit, the pressure in the tire increases, the spring is compressed, as is also the air in the high-pressure cylinder, the valve at the bottom of this cylinder closing automatically. As the pressure in the high-pressure cylinder increases the inflating valve at the top of this cylinder opens automatically and some of the air passes from the high-pressure cylinder into the chamber intermediate between it and the low pressure cylinder. There is a valve-controlled passage also between this intermediate chamber and the low-pressure cylinder; this valve opens under an upward pressure, so that whenever the pressure in the intermediate chamber exceeds that in the low-pressure cylinder the valve opens and air passes from the intermediate chamber into the low-pressure cylinder and thence into the tire. When the normal pressure of 25 lb. per sq. in. is reached operation ceases.

The rate of pumping of the tire can be controlled by adjustment of the main spring, which is evidently made by using shims of different thickness. Tests are claimed to have shown that average over-night pressure losses due to tube porosity or slow leaks can be made up in about 25 minutes of driving over ordinary roads, while on rough roads the time required is materially reduced.



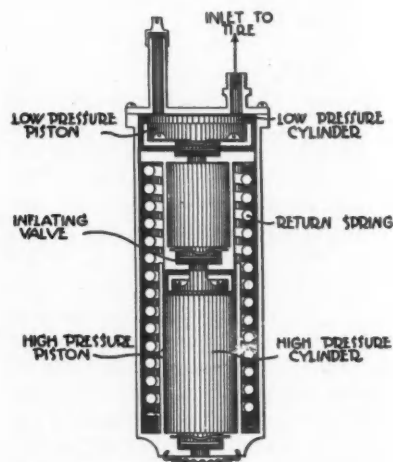
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Built as only
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can build

For passenger cars, trucks and busses there is a Mechanics Roller Bearing Joint or Shaft Assembly that will meet every requirement. "Built as only 'Mechanics' can build" means more than a quarter-century of experience in the universal joint business—designing, manufacturing, inspecting, testing, servicing products of the highest quality. As a result, Mechanics Roller Bearing Universal Joints are simple, reliable, durable, and economical. All of their parts having any appreciable effect on balance are machined all over. Integral keys, instead of screws or bolts, transmit driving torque. Ample provision is made for easy lubrication. Assembly is simple. For the main drive, in steering gears, for driving air compressors, generators, fans—for every purpose that requires a universal joint "Make it a Mechanics Universal Joint". Investigate. Write, today, for complete information.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS

August 22, 1936



Sectional view of Evans Hub-Cap Inflator.

Common Sense Ventilation is an unusually interesting booklet issued by the Swartwout Co., Cleveland. The booklet—Bulletin V-100-B—is non-technical and explains clearly the method of natural ventilation as applied to different ventilating problems.

Automotive Industries